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AS-207 LAUNCH VEHICLE OPERATIONAL FLIGHT TRAJECTORY
DISPERSION ANALYSIS

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FOREWORD

This report documents the AS-207 Launch Vehicle Operational Flight Trajectory Dispersion Analysis. The data presented herein are intended primarily for establishing trajectory parameter envelopes about the predicted S-IB and S-IVB stage end conditions of flight and confirmation of the flight performance reserve requirement. The analysis documented herein was performed by the Aerospace Physics Branch, Chrysler Corporation Space Division, under NAS8-4016, Modification MSFC-1, Amendment 21, and 23, BB Item 3.1.3-12.

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DEFINITIONS AND SYMBOLS

Aerodynamic Heating Indicator

$$\int \frac{q V_r}{\pi/2 - |\alpha_t|} dt$$

q = dynamic pressure
 V_r = relative velocity
 α_t = total angle of attack

Aerodynamic Load Indicator

Product of dynamic pressure and angle of attack.

Altitude

Vehicle altitude above the referenced ellipsoid measured along the geocentric position vector.

Angle of Attack

Angle between the relative velocity vector and the longitudinal axis of the vehicle measured positive nose up.

Central Range Angle

Angle between instantaneous space fixed position vector and space fixed position vector at Guidance Reference Release

Descending Node Argument

Angle measured in the equatorial plane between the orbit plane descending node and the space fixed meridian plane defined at Guidance Reference Release.

Earth Fixed Position

Position vector components in an earth-fixed pad-centered plumbline coordinate system. The Xe axis is coincident with the reference ellipsoid normal, positive upward. The Xe axis is parallel to the earth-fixed aiming azimuth and is positive downrange. The Ye axis completes a right handed system. (PASCS 10.)

Earth Fixed Cross Range

Ye component of PASCS 10 position vector.

Earth Fixed Flight Path Angle

Angle between the earth fixed velocity vector and the earth fixed position vector (PASCS 10). Measured positive downrange from position vector.

Earth Fixed Velocity

Velocity vector components in PASCS 10.

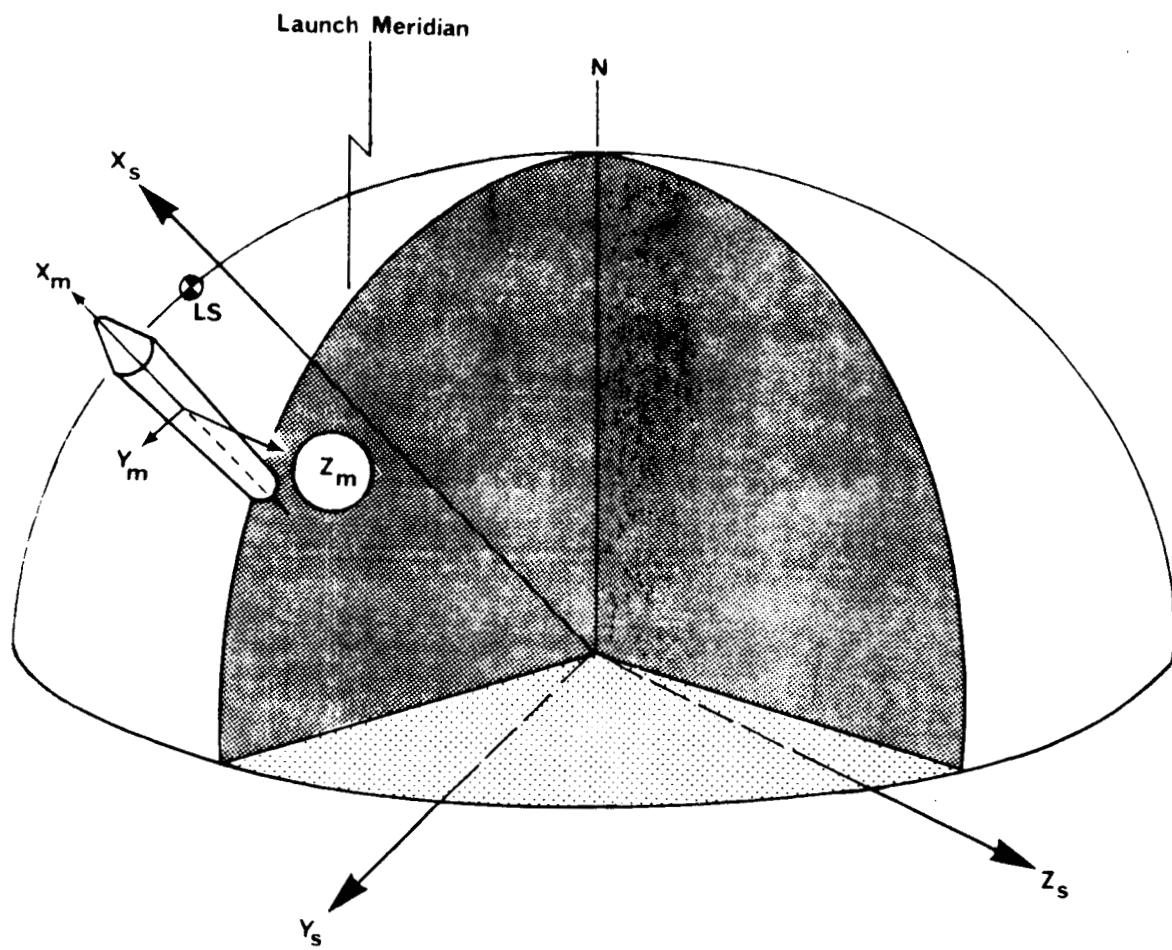
Earth Fixed Velocity Magnitude

$$\sqrt{\dot{x}_e^2 + \dot{y}_e^2 + \dot{z}_e^2}$$

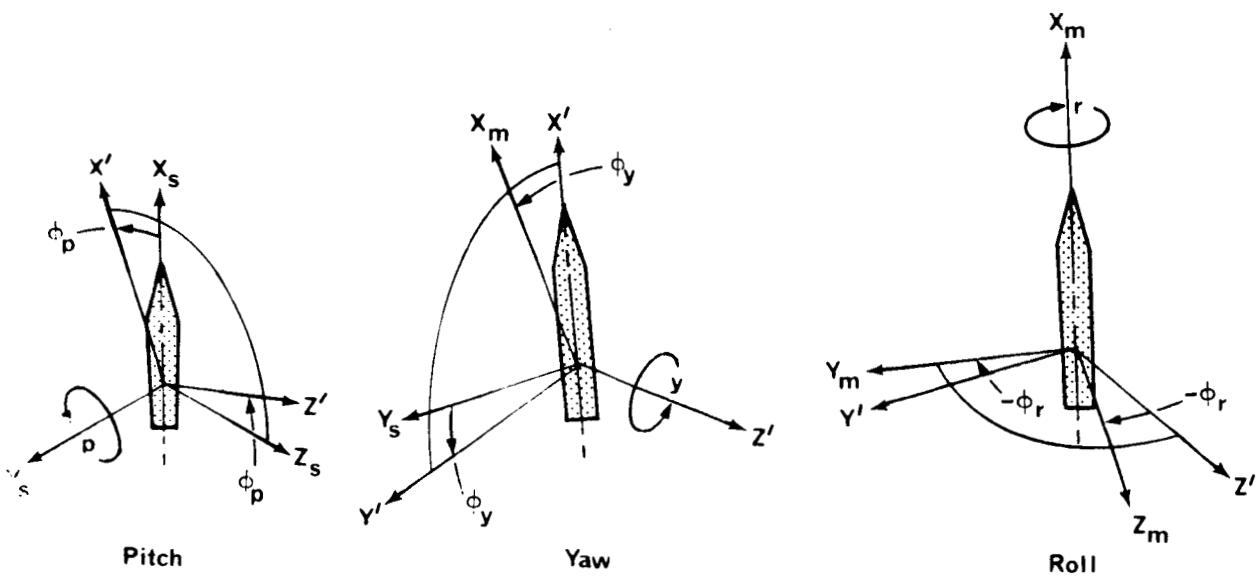
DEFINITIONS AND SYMBOLS (Cont'd)

Flight Azimuth	Angle defining orientation of the space fixed coordinate system downrange axis, Zs, at Guidance Reference Release. Measured positive east of north in plane normal to the space fixed Xs axis at Guidance Reference Release.
Geocentric Declination	Angle between the geocentric radius vector and the true equatorial plane measured positive north of the equator.
Geodetic Latitude	Angle between the reference ellipsoid normal through the point of interest and the true equatorial plane, measured positive north of the equator.
Ground Range	Surface range measured from launch site to the sub vehicle point.
Inclination	Inclination of instantaneous flight plane with equatorial plane. Defined by the vector R x V in PASCS No. 13.
Longitude	Angle between the Greenwich meridian plane and the projection of the geocentric position vector in the equatorial plane (Positive west of Greenwich.)
Longitudinal Acceleration	That part of the total measurable acceleration directed along the longitudinal axis of the vehicle.
Mass	Mass of the vehicle.
Pitch, Yaw, Roll	Eulerian angles of vehicle attitude measured with respect to the space fixed coordinate system. Vehicle attitude is defined by the ordered rotation of pitch, yaw and roll, respectively. (See illustration)
Radius	$\sqrt{X_s^2 + Y_s^2 + Z_s^2}$
Space Fixed Position	Position vector components in a space fixed, earth centered, plumbline coordinate system defined at Guidance Reference Release. The Xs axis is parallel to the reference ellipsoid normal which passes through the launch site. The Zs axis is parallel to, and positive in the same direction as the earth-fixed firing azimuth. The Ys axis completes the right handed system. This is Project Apollo Standard Coordinate System 13. (PASCS 13.)

DEFINITIONS AND SYMBOLS (Cont'd)



$$\bar{x}_m = (-\phi_r)_1 (\phi_y)_3 (\phi_p)_2 \bar{x}_s$$



DEFINITIONS AND SYMBOLS (Cont'd)

Space Fixed Cross Range	v_s component of PASCS 13 position vector.
Space Fixed Flight Path Angle	Angle between the space-fixed velocity vector and the radius vector (PASCS 13) measured positive downrange from radius vector.
Space Fixed Velocity	Velocity vector components in PASCS 13.
Space Fixed Velocity Magnitude	$\sqrt{\dot{x}_s^2 + \dot{y}_s^2 + \dot{z}_s^2}$
Time	Instantaneous flight time referenced to first motion.
Weight	Weight of vehicle in pounds.

SUMMARY

This report presents the AS-207 Launch Vehicle Operational Flight Trajectory three-sigma flight envelope. Statistical combinations of three-sigma perturbation effects were accomplished by the Root-Sum-Square (RSS) technique. Concise summaries of pertinent trajectory parameter dispersions at S-IB/S-IVB physical separation and J-2 engine cutoff signal follow:

S-IB/S-IVB SEPARATION

FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED		GROUND RANGE (M)	EARTH FIXED CROSS RANGE (M)
		VELOCITY (M/S)	PATH ANGLE (DEG)		
RSS (+)	6.29	2155.	35.35	2.702	7849.
RSS (-)	2.66	1997.	35.89	1.891	3208.

J-2 ENGINE CUTOFF SIGNAL

FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	PATH ANGLE (DEG)	GROUND RANGE (M)
RSS (+)	20.22	619.	1.60	72716.
RSS (-)	17.52	618.	1.60	70384.

S-IB and S-IVB propulsion system perturbations produce deviations in J-2 Engine Mixture Ratio (EMR) shift time. Dispersion envelopes for each propulsion group and the total envelope are presented below:

J-2 EMR SHIFT TIME DEVIATION

	S-IB PROPULSION (SEC)	S-IVB PROPULSION (SEC)	TOTAL (SEC)
RSS (+)	6.86	48.22	48.70
RSS (-)	2.45	50.48	50.54

The results of this dispersion analysis reveal that the maximum expected variations in the establishment of the LVDC time bases are:

	TB2	TB3	TB4
RSS (+)	1.75	5.75	20.22
RSS (-)	2.60	2.66	17.52

It should be acknowledged that the positive RSS value quoted above for TB2 and TB3 (1.75 and 5.75) are the limits provided by the LVDC sequencing backups.

The S-IVB stage Flight Performance Reserve (FPR) for the AS-207 Mission, as determined from the dispersion analysis discussed herein, is 1557 pounds. This FPR is well within the excess usable propellants (4524 pounds) predicted in Reference 11.

Fixed time partials for vehicle, environmental, and inertial measurement unit dispersions are evaluated at 700 seconds and are presented in Addendum I, which will be published under separate cover.

SECTION 1
INTRODUCTION

Launch vehicle performance is predictable only within certain tolerances. Therefore, deviations from a predicted launch vehicle trajectory are expected. In order to establish realistic deviation limits for the AS-207 Launch Vehicle Operational Flight Trajectory, a dispersion analysis has been conducted and is documented in this report.

The predicted nominal trajectory employed for the dispersion analysis is the Launch Vehicle Operational Flight Trajectory presented in Reference 11. The error sources considered for the dispersion analysis are those associated with predictions of vehicle characteristics, vehicle systems performances, and flight environment. The nominal vehicle and trajectory, error sources, the analytic procedures utilized, and the results are discussed in the following sections.

SECTION 2

DISCUSSION

2.1 MISSION DESCRIPTION: The Apollo Saturn 207 mission plan provides for the rendezvous of a Lunar Module (LM) with a Command Service Module (CSM). The assignment for the SA-207 Launch Vehicle is to place the S-IVB/IU/CSM configuration into a 101/107 nautical mile orbit. Specific mission data for the AS-207 Launch Vehicle Operational Flight Trajectory are presented in Reference 11.

2.1.1 Flight Sequence of Events: The nominal flight sequence of events for this analysis is presented in Table 1. Off-nominal propulsion system performances produce significant changes in this nominal sequence of events. Of primary interest are the events which establish LVDC time bases and thus the subsequent events dependent on these time bases. A discussion of pertinent time bases and associated events follows:

- 1) Time Base 2 (TB2): Established by S-IB stage propellant level sensor actuation or by a back-up LVDC signal initiated 1.75 seconds after the precalculated time, if a significant downrange velocity appears. The dependent events are Inboard Engine Cutoff signal (IECO), interconnection of thrust O.K. switches, and fuel depletion probe arming.
- 2) Time Base 3 (TB3): Established at Outboard Engine Cutoff (OECO) by actuation of propellant depletion probes or by a backup LVDC signal issued 10.00 seconds after establishment of Time Base 2. Pertinent dependent events are ullage rocket firing, S-IB retro-rocket firing, S-IB/S-IVB separation signal, J-2 engine start signal, and IGM guidance initiation.
- 3) Time Base 4 (TB4): TB4 is initiated at approximately 0.2 seconds after Guidance Cutoff Signal (GCS). GCS is initiated when the S-IVB stage obtains a predetermined space fixed velocity magnitude. The significant events subsequent to TB4 are the preplanned orbital maneuvers and S-IVB stage venting.

It should be noted that TB2 and TB3 establishments are nominally dependent upon propellant level sensor actuations. Therefore, establishment of these time bases is very sensitive to propulsion system perturbations which effect propellant flowrate, and thus, tank level histories.

2.1.2 Launch Vehicle and Flight Environment: The nominal AS-207 Launch Vehicle mass characteristics, propulsion system characteristics, and vehicle aerodynamic properties used in this analysis are those presented in Reference 11. Table 2 presents the nominal vehicle weight breakdown.

The 1963 Patrick Reference Atmosphere model and the December wind profiles presented in Reference 4 define the atmospheric properties used in this

analysis. The guidance and control modes defined in Reference 11 were incorporated in each trajectory simulation discussed herein.

2.2 ERROR SOURCES: Vehicle manufacturing tolerances, predicted system performance inaccuracies, and flight environment anomalies are sources of errors which significantly effect trajectory predictions. To facilitate statistical analyses of such error effects, three-sigma deviations have been established. The three-sigma deviations considered in this analysis, with corresponding references, are displayed in Table 3.

2.3 TRAJECTORY DISPERSIONS: The perturbations investigated in this analysis are assumed to be random, independent, and normally distributed. These assumptions allow application of the Root-Sum-Square (RSS) statistical combination method to produce a trajectory dispersion envelope.

Dispersed AS-207 trajectories were simulated with each of the three-sigma deviations listed in Table 3. Effects on pertinent trajectory parameters at S-IB/S-IVB stage separation and S-IVB stage guidance cutoff were determined and combined as follows:

$$+RSS = \sqrt{\sum (+\Delta P)^2}$$

$$-RSS = \sqrt{\sum (-\Delta P)^2}$$

ΔP = perturbed parameter - nominal parameter.

These RSS values define a reasonable three-sigma flight envelope for the AS-207 Launch Vehicle Operational Flight Trajectory. In a similar manner, utilizing trajectory dispersion data, the S-IVB Flight Performance Reserve (FPR) required to offset the combined three-sigma deviations was determined.

SECTION 3

RESULTS

3.1 TRAJECTORY DISPERSION ENVELOPE: Trajectory dispersion results are presented for two events, S-IB/S-IVB stage separation and J-2 guidance cutoff. Tables 4 - 7 and 9 - 12 present, for each event, three-sigma envelopes for the following error source groups:

1. S-IB Stage Propulsion and Flight Environment
2. S-IB Stage Non-Propulsion
3. S-IVB Stage Propulsion
4. S-IVB Stage Non-Propulsion

In the cases where both \pm 3-sigma deviations produced effects with like algebraic signs, only the larger effect was included in the RSS.

Tables 8 and 13 display predicted three-sigma flight envelopes. These envelopes are the root-sum-squares of the above source group envelopes and Inertial Measurement Units (IMU) error effects (Reference 16).

Analysis results show that the expected extreme deviations for TB2 are +1.75 and -2.60 seconds. The +1.75 second deviation is restricted by the LVDC backup signal criteria. Analysis also reveals that the maximum deviations expected for TB3 are +5.75 seconds and -2.66 seconds. The positive TB3 deviation, 5.75 seconds, is the maximum allowed under the LVDC backup sequencing program. Since S-IB/S-IVB stage separation, J-2 ignition, and IGM initiation times are dependent on TB3, the maximum expected deviations for these events are the same as that of TB3. This fact is reflected in Table 8 for S-IB/S-IVB stage separation.

Engine Mixture Ratio (EMR) shift time was found to have maximum expected deviations of +48.70 seconds and -50.54 seconds. These deviations are produced by S-IB and S-IVB propulsion dispersions, with the major contributors being S-IVB propellant loading and flowrate deviations. It is found that the maximum expected variations in TB4 are +20.22 seconds and -17.52 seconds as shown in Table 13. These variations are primarily due to S-IVB propulsion perturbations.

The error sources prescribed for this analysis, Table 3, do not include conditions and tolerances which contribute to a realistic vehicle attitude rate envelope determination at S-IB/S-IVB physical separation. Therefore, the total attitude rate envelope at S-IB/S-IVB stage separation has not been included in Table 8. This envelope will be determined prior to the vehicle launch date.

During S-IVB stage flight, roll control is maintained by the Auxiliary Propulsion System (APS). Essentially, this system independently corrects roll attitude errors when the error signal exceeds one degree. Since this criteria limits the roll attitude deviations and no APS errors were considered, the RSS technique is not applicable. This is indicated in Table 13.

A comprehensive flight envelope of pertinent design parameters during S-IB stage flight is presented in Table 14.

To enhance cursory evaluations of future vehicle systems change effects, pertinent S-IB stage performance trade-off factors are provided in Table 15. This table of trade-off factors is applicable at S-IB/S-IVB separation. Table 16 presents similar trade-off factors for the J-2 cutoff event. This table encompasses both S-IB and S-IVB stage error sources.

An accompanying set of position and velocity vector dispersion data, evaluated at 700 seconds, is provided in Addendum I (published under separate cover).

3.2 S-IVB STAGE FLIGHT PERFORMANCE RESERVE: Table 17 presents the derivation of the 1557 pound S-IVB stage propellant reserve required to offset the effects of the 3-sigma deviations shown in Table 3. This table includes individual perturbation effects on S-IVB stage propellant consumed and the readily applicable trade-off factors.

SECTION 4

REFERENCES

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12. "ST-124M Platform Hardware Errors to be Used in Performing a Hardware Error Analysis of the Saturn IB and Saturn V Launch Vehicle", R-ASTR-NG-168-66, 12 December 1966 (C).
13. "Project Apollo Coordinate System Standards", SE008-001-1, June 1965.
14. "S-IB Stage 200K and 205K H-1 Engine Thrust Decay Profiles", R-P&VE-PPE-66-M-99, 3 June 1966.
15. "SATURN IB J-2 Engine Characteristics", R-P&VE-PPE-66-M-90, 11 May 1966.
16. "AS-207 Rendezvous Mission Launch Vehicle Guidance Error Analysis", TB-AP-67-108, (To be published).

TABLE 1

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
NOMINAL FLIGHT SEQUENCE OF EVENTS

<u>NOMINAL FLIGHT TIME</u> <u>(HR:MIN:SEC)</u>	<u>TIME</u> <u>(SEC)</u>	<u>PROGRAM</u> <u>TIME (SEC)</u>	<u>EVENT</u>
- 0:0:05.0	- 5.00	----	Guidance Reference Release (GRR).
- 0:0:03.1	- 3.10	----	Initiate S-IB Mainstage Ignition Sequence.
0:0:00.0	0.00	----	First Motion.
0:0:00.2	0.20	(0.0) ₁	Lift-off Signal. Initiate Time Base 1.
0:0:10.2	10.20	(10.0) ₁	Initiate Pitch and Roll Maneuvers.
0:1:13.5	73.50	-----	Maximum Dynamic Pressure.
0:2:12.2	132.20	(132.0) ₁	Tilt Arrest.
0:2:12.3	132.32	(132.1) ₁	Enable S-IB Propellant Level Sensors.
0:2:14.3	134.32	(0.0) ₂	Level Sensor Activation. Initiate Time Base 2.
0:2:17.3	137.32	(3.0) ₂	Inboard Engine Cutoff (IECO).
0:2:20.3	140.32	(0.0) ₃	Outboard Engine Cutoff (OECO). Initiate Time Base 3.
0:2:21.6	141.62	(1.3) ₃	Separation Signal.
0:2:21.7	141.70	-----	S-IB/S-IVB Physical Separation.
0:2:23.0	143.02	(2.7) ₃	J-2 Engine Start Command.
0:2:25.5	145.45	-----	Ullage Burn Out.
0:2:26.4	146.42	-----	90% J-2 Thrust Level.
0:2:29.4	149.42	(9.1) ₃	Activate PU System.
0:2:33.6	153.62	(13.3) ₃	Jettison Ullage Rocket Motors.
0:3:01.3	181.32	-----	Jettison LES.
0:3:04.3	184.32	(44.0) ₃	Initiate Active Guidance (Command).
0:7:24.5	444.50	-----	EMR Shift Sensed by IGM.
0:9:53.2	593.21	-----	Guidance Cutoff Signal (GCS).
0:9:53.4	593.41	(0.0) ₄	Initiate Time Base 4.
0:10:03.2	603.21	-----	Orbital Insertion.
3:10:00.0	11400.	-----	CSM Separation.
4:30:00.0	16200.	-----	Loss of S-IVB/IU Attitude Control.

TABLE 2

**AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
NOMINAL VEHICLE WEIGHT BREAKDOWN**

Spacecraft	38,100	
Instrument Unit	4,093	
S-IVB Stage Inert	23,869	
Useable Reserve Propellant (Includes FPR) Injection Weight	<u>4,524</u>	70,586
J-2 Thrust Decay Propellant and LOX Venting	<u>192</u>	
S-IVB Cutoff Weight		70,778
S-IVB Propellant Consumed	223,730	
S-IVB APS Propellant Consumed	4	
Launch Escape System	8450	
Ullage Cases	<u>220</u>	
S-IVB "90% Thrust" Weight		303,182
S-IVB Start and Buildup Prpt. Consumed	430	
Ullage Propellant Consumed	<u>186</u>	
S-IVB Stage Weight at Separation		303,798
S-IVB Separation and Ullage Components	4	
S-IVB Aft Frame Hardware	30	
S-IB/S-IVB Interstage	6,457	
S-IB Dry Weight	83,507	
S-IB Residuals and Reserves	10,651	
S-IVB Frost Consumed	100	
S-IB Frost Consumed	1,000	
S-IB Seal Purge Consumed	5	
S-IB Fuel Additive Consumed	26	
S-IB Gearbox Lubricant Consumed	705	
Inboard Engine Thrust Decay Prpt. Consumed	2,178	
Outboard Engine Thrust Decay Prpt. Consumed To Separation	1,991	
S-IB Mainstage Propellant Consumed	<u>882,219</u>	
Vehicle Liftoff Weight		1,292,671

TABLE 3
AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
THREE-SIGMA DEVIATIONS

GROUP	ITEM	DEVIATION	REFERENCE
S-IB Stage Non-Propulsion	Non-Propellant Mass	±310 Pounds	1
	Thrust Misalignment (Pitch)	±0.62 Degrees	1
	Thrust Misalignment (Yaw)	±0.62 Degrees	1
	Thrust Misalignment (Roll)	±0.62 Degrees	1
	Axial Force Coefficient	Maximum & Minimum	2
	*Center of Gravity Offset (Y)	±0.05 Meters	3
	*Center of Gravity Offset (Z)	±0.05 Meters	3
Flight Environment	Headwind	Dec. Maximum	4
	Tailwind	Dec. Maximum	4
	Right Cross Wind	Dec. Maximum	4
	Left Cross Wind	Dec. Maximum	4
	Atmosphere	Maximum & Minimum Profile	5
S-IB Stage Propulsion	High Surface Winds	+ 3σ LOX Density	6
	Low Surface Winds	- 3σ LOX Density	7
	High Surface Temperature	+ 3σ Fuel Density	8
	Low Surface Temperature	- 3σ Fuel Density	9
	Propellant Mass	±0.35% LOX, ±0.35% Fuel	1
	Thrust and Flow Rate	±1.5%	1
	ISP and Flow Rate	±0.9 Seconds	1
	Engine Mixture Ratio	+ 2920 Pound LOX Bias	1
	Engine Mixture Ratio	+ 1290 Pound Fuel Bias	1
	H-1 Engine Thrust Decay:		
	Engine 2 and 4:	±62,350 Lb-sec.	14
	Engine 1,3, 5-8:	±65,400 Lb-sec.	14
S-IVB Stage Non-Propulsion	Non-Propellant Mass	±200 Pounds	1
	*Center of Gravity Offset (Y)	±0.05 Meters	1
	*Center of Gravity Offset (Z)	±0.05 Meters	1
	Thrust Misalignment (Pitch)	±1.24 Degrees	1
	Thrust Misalignment (Yaw)	±1.24 Degrees	1
S-IVB Stage Propulsion	E.M.R. Shift	±30 Seconds	10
	Thrust and Flow Rate	±3%	10
	ISP and Flow Rate	±3.12 Seconds	10
	LH ₂ Mass, LOX Mass	±1%, ±1%	10
	J-2 Engine Thrust Decay	±0.03 Sec. x C.O. Thrust	15
Instrument	Inertial Measurement Units	-----	12

* Referenced to Project Apollo Standard Coordinate System 9.

TABLE 4

AS-200/ LAUNCH VEHICLE TRAJECTORY CISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-1B/S-IVB SEPARATION

S-1B STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	SPACE FIXED FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED VELOCITY AZIMUTH (DEG)	VEHICLE WEIGHT (LB)
NOMINAL	141.70	60337.	2427.28	65.949	67298.	84.466	40447.
HIGH SURF. WIND +LUX(P)	0.97	-139.	7.60	0.357	1128.	-0.000	-1290.
LOW SURF. -IND -LUX(P)	-0.60	131.	-3.95	-0.235	-665.	0.000	613.
HIGH AMB. TEMP. +FUEL(P)	-1.36	676.	-4.73	-0.624	-1303.	-0.000	-112.
LOW AMB. TEMP. -FUEL(P)	5.66	-472.	-2.06	1.991	6685.	0.030	2006.
PRPT. LOADING MASS + LOX	0.52	145.	10.96	0.141	731.	-0.003	-993.
PRPT. LOADING MASS - LOX	-0.51	-147.	-10.99	-0.143	-727.	0.003	993.
PRPT. LOADING MASS + FUEL	0.00	-173.	-4.32	0.038	-108.	0.002	977.
PRPT. LOADING MASS - FUEL	0.00	173.	4.34	-0.038	108.	-0.002	-977.
THRUST AND FLOWRATE (+)	-2.07	1261.	2.03	-1.020	-1799.	-0.004	0.
THRUST AND FLOWRATE (-)	2.48	-1019.	-3.79	1.053	2410.	0.009	-0.
-1 ISP AND FLOWRATE (+,+)	0.45	256.	9.44	0.104	668.	-0.002	-0.
-1 ISP AND FLOWRATE (-,+)	-0.45	-255.	-9.14	-0.106	-663.	0.002	0.
E.M.R. LOX BIAS	-0.31	-325.	-12.41	-0.034	-588.	0.004	1920.
E.M.R. FUEL BIAS	-0.21	-218.	-8.34	-0.023	-394.	0.003	1290.
H-1 ENGINE THRUST DECAY (+)	0.00	1.	0.99	-0.002	2.	-0.001	0.
H-1 ENGINE THRUST DECAY (-)	0.00	-1.	-0.98	0.002	-2.	0.001	0.
POSITIVE RSS	*6.29	1476.	17.05	2.288	7264.	0.032	3167.
NEGATIVE RSS	-2.66	-1226.	-20.74	-1.233	-2589.	-0.006	-1902.

*Deviation restricted to 5.75 sec by LNDC backup signal for QECO.

TABLE 4 (Cont'd)

AS-201 LAUNCH VEHICLE TRAJECTORY CISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-1B/S-IVB SEPARATION
S-1B STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC.)	** SPACE FIXED POSITION VECTOR **			** SPACE FIXED VELOCITY VECTOR **		
		X (M)	Y (M)	Z (M)	XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	141.70	6432357.	24946.	125771.	945.57	43.53	2235.11
HIGH SURF. WIND +LUX(ρ)	0.97	-170.	43.	1532.	-11.58	-0.09	13.10
LOW SURF. WIND -LUX(ρ)	-0.60	149.	-27.	-913.	7.94	0.06	-7.67
HIGH AMB. TEMP. +FUEL(ρ)	-1.36	713.	-62.	-1859.	23.03	0.15	-15.05
LOW AMB. TEMP. -FUEL(ρ)	5.66	-659.	254.	9054.	-82.18	-0.27	30.81
PRPT. LOADING MASS + LOX	0.52	126.	23.	951.	-1.58	-0.08	12.56
PRPT. LOADING MASS - LOX	-0.51	-129.	-23.	-948.	1.60	0.08	-12.62
PRPT. LOADING MASS + FUEL	0.00	-171.	0.	-113.	-3.13	0.01	-3.37
PRPT. LOADING MASS - FUEL	0.00	-171.	-0.	113.	3.15	-0.01	3.38
THRUST AND FLOWRATE (+)	-2.07	1313.	-95.	-2641.	41.39	0.20	-15.75
THRUST AND FLOWRATE (-)	2.48	-1088.	112.	3428.	-43.88	-0.18	13.98
ISP AND FLOWRATE (+,-)	0.45	238.	20.	863.	-0.68	-0.06	10.54
ISP AND FLOWRATE (-,+)	-0.45	-238.	-20.	-858.	0.84	0.06	-10.28
E.M.R. LOX BIAS	-0.31	-311.	-13.	-727.	-3.26	0.06	-12.10
E.M.R. FUEL BIAS	-0.21	-209.	-9.	-488.	-2.20	0.04	-8.13
H-1 ENGINE THRUST DECAY (+)	0.00	1.	-0.	2.	0.46	-0.00	0.89
H-1 ENGINE THRUST DECAY (-)	0.00	-1.	0.	-2.	-0.45	0.00	-0.88
POSITIVE RSS	6.29	1535.	283.	9886.	48.17	0.28	39.97
NEGATIVE RSS	-2.66	-1359.	-121.	-3666.	-94.00	-0.36	-30.93

TABLE 4(Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-1B/S-IVB SEPARATION

S-1B STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR **			** EARTH FIXED VELOCITY VECTOR XDOT YDOT ZDOT		
		X (M)	Y (M)	Z (M)	(M/S)	(M/S)	(M/S)
NOMINAL	141.70	59979.	93.	67913.	970.74	4.57	1816.37
HIGH SURF. WIND +LOX(P)	0.97	-151.	4.	1137.	-11.25	0.10	13.15
LOW SURF. -WIND -LOX(P)	-0.60	138.	-2.	-670.	7.74	-0.06	-7.71
HIGH AMB. TEMP. +FUEL(P)	-1.36	689.	-5.	-1308.	22.62	-0.10	-15.22
LOW AMB. TEMP. -FUEL(P)	5.66	-546.	24.	6743.	-80.65	0.62	31.28
PRPT. LOADING MASS + LOX	0.52	137.	2.	739.	-1.34	0.05	12.54
PRPT. LOADING MASS - LOX	-0.51	-140.	-2.	-736.	1.36	-0.05	-12.59
PRPT. LOADING MASS + FUEL	0.00	-172.	-0.	-111.	-3.17	-0.01	-3.33
PRPT. LOADING MASS - FUEL	0.00	172.	0.	111.	3.18	0.01	3.34
THRUST AND FLOWRATE (+)	-2.07	1280.	-7.	-1804.	40.83	-0.15	-16.08
THRUST AND FLOWRATE (-)	2.48	-1045.	9.	2422.	-43.24	0.21	14.31
ISP AND FLOWRATE (+,-)	0.45	248.	2.	677.	-0.47	0.05	10.50
ISP AND FLOWRATE (-,+)	-0.45	-248.	-2.	-672.	0.64	-0.05	-10.25
E.M.R. LOX BIAS	-0.31	-319.	-1.	-597.	-3.46	-0.04	-12.03
E.M.R. FUEL BIAS	-0.21	-214.	-1.	-400.	-2.33	-0.03	-8.08
H-1 ENGINE THRUST DECAY (+)	0.00	1.	0.	2.	0.47	0.00	0.88
H-1 ENGINE THRUST DECAY (-)	0.00	-1.	0.	-2.	-0.46	-0.00	-0.87
POSITIVE RSS	6.29	1497.	27.	7324.	47.45	0.67	40.44
NEGATIVE RSS	-2.66	-1275.	-9.	-2603.	-92.33	-0.21	-31.14

TABLE 4 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-1B/S-IVB SEPARATION

S-1B STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC.)	** VEHICLE ATTITUDE **			** VEHICLE ATTITUDE RATE **		
		PITCH (DEG.)	ROLL (DEG.)	YAW (DEG.)	PITCH (DEG/S)	ROLL (DEG/S)	YAW (DEG/S)
NOMINAL	141.70	-62.720	-0.074	-0.005	-0.010	0.003	-0.003
HIGH SURF. WIND +LOX(ρ)	0.97	0.023	-0.003	0.004	0.017	-0.002	0.004
LOW SURF. -INDU -LOX(ρ)	-0.60	-0.017	0.002	-0.002	-0.013	0.002	-0.002
HIGH AMB. TEMP. +FUEL(ρ)	-1.36	-0.040	-0.000	-0.006	-0.034	-0.000	-0.006
LOW AMB. TEMP. -FUEL(ρ)	5.66	0.124	-0.008	0.020	0.090	-0.003	0.020
PRPT. LOADING MASS + LOX	0.52	0.012	-0.001	0.002	0.007	-0.000	0.002
PRPT. LOADING MASS - LOX	-0.51	-0.016	0.001	-0.002	-0.010	0.000	-0.002
PRPT. LOADING MASS + FUEL	0.00	0.000	-0.000	0.000	0.001	0.000	0.000
PRPT. LOADING MASS - FUEL	0.00	-0.000	-0.000	-0.000	-0.001	-0.000	-0.000
THRUST AND FLOWRATE (+)	-2.07	-0.056	0.000	-0.009	-0.054	0.000	-0.010
THRUST AND FLOWRATE (-)	2.48	0.062	-0.007	0.010	0.045	-0.005	0.010
ISP AND FLOWRATE (+, -)	0.45	0.010	0.000	0.001	0.006	0.000	0.001
ISP AND FLOWRATE (-, +)	-0.45	-0.012	0.000	-0.008	-0.002	-0.005	-0.002
E.M.R. LOX BIAS	-0.31	-0.009	0.001	-0.001	-0.005	0.001	-0.001
E.M.R. FUEL BIAS	-0.21	-0.006	0.001	-0.001	-0.003	0.001	-0.001
H-1 ENGINE THRUST DECAY (+)	0.00	0.001	0.000	0.001	0.000	0.000	0.000
H-1 ENGINE THRUST DECAY (-)	0.00	-0.001	0.000	-0.000	-0.001	0.000	-0.000
POSITIVE RSS	6.29	0.141	0.002	0.023	0.103	0.002	0.023
NEGATIVE RSS	-2.66	-0.074	-0.011	-0.011	-0.067	-0.006	-0.012

TABLE 4(Cont'd)

AS-201 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-1B/S-IVB SEPARATION

S-1B STAGE PROPULSION THREE SIGMA DEVIATIONS						
VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED VELOCITY AZIMUTH (DEG)
NOMINAL	141.70	28.597	79.879	2059.50	61.293	83.204
HIGH SURF. WIND +LOX(P)	0.97	0.001	-0.011	6.36	0.437	0.009
LOW SURF. WIND -LOX(P)	-0.60	-0.001	0.007	-3.13	-0.285	-0.005
HIGH AMB. TEMP. +FUEL(P)	-1.36	-0.001	0.013	-2.59	-0.744	-0.011
LOW AMB. TEMP. -FUEL(P)	5.66	0.007	-0.068	-8.63	2.340	0.058
PRPT. LOADING MASS + LOX	0.52	0.001	-0.007	10.44	0.190	0.005
PRPT. LOADING MASS - LOX	-0.51	-0.001	0.007	-10.45	-0.193	-0.005
PRPT. LOADING MASS + FUEL	0.00	-0.000	0.001	4.43	-0.035	-0.000
PRPT. LOADING MASS - FUEL	0.00	0.000	-0.001	4.45	-0.035	0.000
THRUST AND FLOWRATE (+)	-2.07	-0.002	0.018	5.52	-1.193	-0.016
THRUST AND FLOWRATE (-)	2.48	0.002	-0.024	-7.27	1.231	0.021
ISP AND FLOWRATE (+,-)	0.45	0.001	-0.007	9.04	0.143	0.005
ISP AND FLOWRATE (+,+)	-0.45	-0.001	0.007	-8.73	-0.145	-0.005
E.M.R. LOX BIAS	-0.31	-0.001	0.006	-12.23	-0.068	-0.003
E.M.R. FUEL BIAS	-0.21	-0.000	0.004	-8.23	-0.045	-0.002
H-1 ENGINE THRUST DECAY (+)	0.00	0.000	-0.000	1.00	0.000	0.000
H-1 ENGINE THRUST DECAY (-)	0.00	-0.000	0.000	-0.99	-0.000	0.000
POSITIVE RSS	6.29	0.008	0.026	16.80	2.690	0.063
NEGATIVE RSS	-2.66	-0.003	-0.074	-22.20	-1.457	-0.021

TABLE 5

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-1B/S-IVB SEPARATION

S-1B STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	SPACE FIXED FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED VELOCITY AZIMUTH (DEG)	VEHICLE WEIGHT (LB)
NOMINAL	141.70	60337.	2427.28	65.949	67258.	84.466	404447.
NON-PROPELLANT MASS (+)	0.00	-55.	-1.37	0.012	-34.	0.000	310.
NON-PROPELLANT MASS (-)	0.00	55.	1.37	-0.012	34.	-0.000	-310.
THRUST MIS. - PITCH	0.00	-1280.	1.807	1.367	1928.	-0.004	0.
THRUST MIS. - PITCH	0.00	1230.	-18.58	-1.366	-1963.	0.005	0.
THRUST MIS. - YAW	0.00	-27.	-1.37	0.009	44.	-1.615	0.
THRUST MIS. - YAW	0.00	-17.	1.15	0.018	11.	1.614	0.
THRUST MIS. + ROLL	0.00	-2.	-0.03	-0.000	3.	-0.069	0.
THRUST MIS. - ROLL	0.00	-6.	0.13	0.006	8.	0.069	0.
AXIAL FORCE COEFF. (+)	0.00	-765.	-13.89	0.166	-459.	0.004	0.
AXIAL FORCE COEFF. (-)	0.00	773.	13.64	-0.166	456.	-0.004	0.
C.G. OFFSET (- Z)	0.00	-327.	5.46	0.353	623.	0.001	0.
C.G. OFFSET (+ Z)	0.00	321.	-5.53	-0.353	-627.	-0.001	0.
C.G. OFFSET (- Y)	0.00	-3.	0.25	0.002	-16.	0.431	0.
C.G. OFFSET (+ Y)	0.00	-4.	-0.27	0.001	22.	-0.431	0.
HEADWIND	0.00	30.	-12.93	-0.158	-1525.	0.002	0.
TAILWIND	0.00	-74.	17.58	0.200	21C5.	-0.002	0.
RIGHT CROSS WIND	0.00	-57.	-5.85	-0.028	-526.	-0.470	0.
LEFT CROSS WIND	0.00	-67.	-5.27	-0.021	-541.	0.366	0.
MAXIMUM ATMOSPHERE	0.00	-150.	-2.86	0.042	-106.	0.001	0.
MINIMUM ATMOSPHERE	0.00	351.	5.20	-0.083	205.	-0.001	0.
POSITIVE RSS	0.00	1530.	29.70	1.436	2965.	1.712	310.
NEGATIVE RSS	-0.00	-1538.	-27.97	-1.432	-2662.	-1.738	-310.

TABLE 5 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPARATION
S-IB STAGE NIN-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME	** SPACE FIXED POSITION VECTOR **			** SPACE FIXED VELOCITY VECTOR **		
		X	Y	Z	XDOT	YDOT	ZDOT
NOMINAL	141.70	6432357.	24946.	125771.	945.57	43.53	2235.11
NON-PROPELLANT MASS (+)	0.00	-54.	0.	-36.	-1.C0	0.00	-1.07
NON-PROPELLANT MASS (-)	0.00	54.	-0.	36.	1.C0	-0.00	1.07
THRUST MIS. + PITCH	0.00	-1319.	4.	1921.	-47.65	-0.00	39.01
THRUST MIS. - PITCH	0.00	1269.	-4.	-1957.	46.05	-0.00	-40.42
THRUST MIS. + YAW	0.00	-24.	-2460.	-16.	-0.66	-62.79	-0.87
THRUST MIS. - YAW	0.00	-19.	2461.	-18.	-0.49	62.80	-0.65
THRUST MIS. + ROLL	0.00	-2.	-169.	2.	0.C0	-2.67	0.01
THRUST MIS. - ROLL	0.00	-6.	169.	9.	-C.18	2.69	0.17
AXIAL FORCE COEF. (+)	0.00	-756.	1.	-478.	-11.70	0.03	-10.15
AXIAL FORCE COEF. (-)	0.00	763.	-1.	475.	11.68	-0.03	9.86
C.G. OFFSET (-Z)	0.00	-340.	15.	622.	-11.90	0.07	10.91
C.G. OFFSET (+Z)	0.00	34.	-15.	-627.	11.79	-0.07	-11.04
C.G. OFFSET (+Z)	0.00	-3.	763.	-16.	-0.C4	16.78	-0.11
C.G. OFFSET (-Y)	0.00	0.	-763.	13.	-0.C7	-16.78	-0.00
C.G. OFFSET (+Y)	0.00	0.	61.	-1539.	1.64	0.11	-14.75
HEADWIND	0.00	-117.	-13.	2123.	-1.74	-0.15	19.81
TAILWIND	0.00	-44.	-1901.	-571.	-0.93	-18.38	-5.68
RIGHT CROSS WIND	0.00	-58.	1661.	-557.	-1.12	14.34	-5.57
LEFT CROSS WIND	0.00	-148.	0.	-109.	-2.72	-0.00	-1.95
MAXIMUM ATMOSPHERE	0.00	347.	-0.	214.	5.20	0.00	3.45
MINIMUM ATMOSPHERE	0.00	-	-	-	-	-	-
POSITIVE RSS	0.00	1559.	3070.	2976.	45.26	66.62	46.30
NEGATIVE RSS	-0.00	-1571.	-3206.	-2676.	-50.62	-67.59	-45.98

TABLE 5 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY CISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-1B/S-IVB SEPARATION
S-1B STAGE NCB-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR **			** EARTH FIXED VELOCITY VECTOR ZDOT		
		X	Y	Z	X	Y	Z
NOMINAL	141.70	59979.	93.	67913.	970.74	4.57	1816.37
NUN-PROPELLANT MASS (+)	0.00	-55.	-0.	-35.	-1.01	-0.00	-1.06
NUN-PROPELLANT MASS (-)	0.00	55.	0.	35.	1.01	0.00	1.06
THRUST MIS. + PITCH	0.00	-1301.	15.	1933.	-47.16	0.33	39.13
THRUST MIS. - PITCH	0.00	1251.	-16.	-1969.	45.54	-0.34	-40.93
THRUST MIS. + YAW	0.00	-27.	-2460.	-3.	-C.76	-62.79	-0.45
THRUST MIS. - YAW	0.00	-17.	2461.	-31.	-0.41	62.80	-1.05
THRUST MIS. + ROLL	0.00	-2.	-169.	3.	-C.00	-2.67	0.03
THRUST MIS. - ROLL	0.00	-6.	170.	8.	-C.17	2.69	0.15
AXIAL FORCE COEF. (+)	0.00	-760.	-0.	-471.	-11.82	-0.02	-9.99
AXIAL FORCE COEF. (-)	0.00	768.	0.	468.	11.80	0.02	9.71
C.G. OFFSET (-Z)	0.00	-334.	18.	625.	-11.76	0.16	11.04
C.G. OFFSET (+Z)	0.00	328.	-18.	-630.	11.65	-0.16	-11.17
C.G. OFFSET (-Y)	0.00	-2.	763.	-20.	-C.02	16.78	-0.22
C.G. OFFSET (+Y)	0.00	-4.	-763.	17.	-0.09	-16.78	0.11
HEADWIND	0.00	46.	2.	-1539.	1.40	-0.02	-14.76
TAILWIND	0.00	-97.	-2.	2124.	-1.42	0.03	19.83
RIGHT CROSS WIND	0.00	-51.	-1904.	-560.	-1.06	-18.42	-5.50
LEFT CROSS WIND	0.00	-61.	1658.	-565.	-1.18	14.29	-5.69
MAXIMUM ATMOSPHERE	0.00	-149.	-0.	-108.	-2.75	-0.01	-1.91
MINIMUM ATMOSPHERE	0.00	349.	1.	211.	5.25	0.02	3.38
POSITIVE RSS	0.00	1545.	3069.	2984.	48.78	66.61	46.75
NEGATIVE RSS	-0.00	-1556.	-3208.	-2683.	-50.15	-67.61	-46.43

TABLE 5 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPARATION
S-IB STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE **			PITCH (DEG)	ROLL (DEG)	** VEHICLE ATTITUDE RATE (DEG/S)	PITCH (DEG/S)	ROLL (DEG/S)	YAW (DEG/S)	ATTITUDE RATE (DEG/S)
		PITCH (DEG)	YAW (DEG)	ROLL (DEG)							
NOMINAL	141.70	-62.720	-0.074	-0.005	-0.010	0.003	-0.003	0.000	0.000	0.000	0.000
NON-PROPELLANT MASS (+)	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NON-PROPELLANT MASS (-)	0.00	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
THRUST MIS. - PITCH	0.00	-1.528	-0.000	0.003	0.020	-0.000	-0.004	-0.023	-0.000	-0.000	-0.000
THRUST MIS. - PITCH	0.00	1.525	-0.000	0.000	0.000	-1.514	0.001	0.000	0.029	0.001	0.001
THRUST MIS. + YAW	0.00	0.000	-0.000	-0.000	-0.001	1.514	-0.001	-0.000	-0.029	-0.001	-0.001
THRUST MIS. - YAW	0.00	0.000	0.000	0.000	0.010	-5.837	0.003	0.005	0.005	-0.002	-0.002
THRUST MIS. + ROLL	0.00	0.001	-0.001	-0.009	5.838	-0.003	-0.003	0.000	0.002	0.001	0.003
THRUST MIS. - ROLL	0.00	-0.001	0.001	0.001	0.000	-0.003	-0.001	-0.001	-0.004	-0.001	-0.001
AXIAL FORCE COEF. (+)	0.00	0.000	-0.003	-0.001	-0.001	-0.169	-0.000	0.001	0.015	-0.000	-0.001
AXIAL FORCE COEF. (-)	0.00	-0.003	0.000	0.001	0.000	0.170	0.000	-0.001	-0.015	0.000	0.001
C.G. OFFSET (-Z)	0.00	-0.169	-0.000	-0.000	-0.000	0.165	0.000	0.011	0.000	-0.018	0.007
C.G. OFFSET (+Z)	0.00	0.170	0.000	0.000	0.000	-0.165	-0.000	-0.011	-0.000	0.018	-0.007
C.G. OFFSET (-Y)	0.00	0.000	0.000	0.000	0.000	0.165	-0.000	-0.011	-0.000	0.018	-0.007
C.G. OFFSET (+Y)	0.00	-0.000	-0.000	-0.000	-0.000	-0.165	0.000	0.003	0.013	0.000	0.003
HEADWIND	0.00	0.019	0.001	-0.001	-0.001	-0.031	-0.001	-0.005	-0.028	-0.001	-0.006
TAILWIND	0.00	-0.031	0.000	0.006	0.005	0.005	0.001	0.001	0.002	0.004	0.001
RIGHT CROSS WIND	0.00	0.005	-0.006	0.000	0.000	-0.003	0.001	0.001	0.001	-0.002	0.000
LEFT CROSS WIND	0.00	0.005	0.000	-0.007	-0.007	-0.003	0.000	-0.001	-0.001	0.000	-0.001
MAXIMUM ATMOSPHERE	0.00	-0.007	0.000	0.000	0.000	0.000	0.001	0.001	0.002	-0.000	0.000
MINIMUM ATMOSPHERE	0.00	0.007	-0.000	-0.000	-0.000	0.000	0.001	0.001	0.002	-0.000	0.000
POSITIVE RSS	0.00	1.535	1.523	5.838	5.838	0.029	0.035	0.009	0.009	0.009	0.009
NEGATIVE RSS	-0.00	-1.537	-1.523	-5.837	-5.837	-0.040	-0.040	-0.035	-0.035	-0.010	-0.010

TABLE 5 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPARATION

S-IB-STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEOETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED AZIMUTH (DEG)	CENTRAL RANGE ANGLE (CEG)
NOMINAL	141.70	28.597	79.879	2059.50	61.293	83.204	1.142
NON-PROPELLANT MASS (+)	0.00	-0.000	0.000	-1.41	C.C11	-0.000	-0.000
NON-PROPELLANT MASS (-)	0.00	0.000	-0.000	1.41	-0.C11	0.000	0.000
THRUST MIS. - PITCH	0.00	0.002	-0.020	13.51	1.648	0.022	0.017
THRUST MIS. - YAW	0.00	-0.002	0.020	-13.77	-1.648	-0.023	-0.018
THRUST MIS. + YAW	0.00	-0.022	0.003	0.06	C.C30	-1.981	-0.001
THRUST MIS. + ROLL	0.00	0.002	-0.003	-0.02	0.C07	1.982	0.001
THRUST MIS. - ROLL	0.00	-0.001	0.000	0.02	C.C01	-0.084	-0.000
AXIAL FORCE COEF. (+)	0.00	-0.001	0.005	0.06	C.C06	0.085	0.000
AXIAL FORCE COEF. (-)	0.00	0.001	-0.005	-14.38	C.164	-0.005	-0.004
C.G. OFFSET (-Z)	0.00	0.000	-0.006	14.13	-0.165	0.001	0.004
C.G. OFFSET (+Z)	0.00	-0.001	0.006	4.26	C.427	0.009	0.006
C.G. OFFSET (-Y)	0.00	-0.007	0.001	-4.30	-C.428	-0.009	-0.006
C.G. OFFSET (+Y)	0.00	0.007	-0.001	-0.09	-0.529	0.000	0.000
HEADWIND	0.00	0.002	0.001	0.08	C.005	-0.529	-0.000
TAILWIND	0.00	0.002	-0.015	-12.34	-C.216	-0.008	-0.014
RIGHT CROSS WIND	0.00	0.016	0.008	16.85	0.274	0.011	0.019
LEFT CROSS WIND	0.00	-0.015	0.004	-5.31	-C.039	-0.580	-0.006
MAXIMUM ATMOSPHERE	0.00	-0.000	0.001	-5.49	-0.C41	0.445	-0.004
MINIMUM ATMOSPHERE	0.00	0.000	-0.002	5.45	C.C43	-0.001	-0.001
POSITIVE RSS	0.00	0.028	0.028	26.76	1.733	2.101	0.027
NEGATIVE RSS	-0.00	-0.028	-0.030	-24.66	-1.727	-2.132	-0.025

TABLE 6

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSSIONS ANALYSIS
 TRAJECTORY DISPERSSIONS AT S-IVB-1VS SEPARATION,
 S-IVB STAGE PROPULSION THREE-SIGMA DEVIATIONS

VARIATION	FLIGHT TIME (SEC)	ALTITUDE (NM)	SPACE FIXED FLIGHT PATH ANGLE (DEG)	SPACE FIXED VELOCITY (M/S)	GROUND RANGE (NM)	SPACE FIXED VELOCITY AZIMUTH (DEG)	VEHICLE WEIGHT (LB)
							10047.
LAD1 AL	141.75	60937.	2427.28	65.949	67298.	84.466	
LAD2 LAD3 (+)	141.75	=64.	-1.59	+0.014	+40.	0.301	360.
LAD2 LAD3 (-)	141.75	62.	1.56	-2.014	39.	-0.301	-352.
LBX LADI (+)	141.75	-340.	-8.51	0.075	-213.	0.003	1927.
LBX LADI (-)	141.75	342.	8.56	-0.075	214.	-0.303	-1927.
POSITIVE RSS	0.00	348.	8.70	0.077	217.	0.003	1960.
NEGATIVE RSS	0.00	-346.	-8.66	-0.077	-217.	-0.003	-1959.

TABLE 6 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSSIONS AT S-II/S-IV SEPARATION
 S-IV₂ STAGE POSITION THREE-SIGMA DEVIATIONS

VARIATION ⁶	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR **			** SPACE FIXED VELOCITY VECTOR **	
		X _{0BT} (")	Y _{0BT} (")	Z _{0BT} (")	X _{0BT} (M/S)	Y _{0BT} (M/S)
NOMINAL	140.70	6422357.	2496.	125771.	965.57	43.53
LH ₂ LOADING (+)	0.00	-63.	0.	-41.	-1.15	-1.24
LH ₂ LOADING (-)	0.00	62.	-5.	41.	1.13	1.22
EX LOADING (+)	0.00	-336.	0.	-222.	-6.17	-6.64
EX LOADING (-)	0.00	338.	0.	223.	6.21	6.67
POSITIVE RSS	0.00	343.	0.	226.	6.31	6.78
NEGATIVE RSS	-0.00	-342.	-0.	-226.	-6.27	-6.75

TABLE 6 (cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT S-IVB/S-IVC SEPARATION
 S-IVB STAGE OR POSITION THREE-SIGMA DEVIATIONS

VARIATION	Flight Time (SEC)	** EARTH FIXED POSITION VECTOR **			** EARTH FIXED VELOCITY VECTOR **		
		X (")	Y (")	Z (")	XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
OFRMAL		141.75	59979.	93.	970.74	4.57	1816.37
+2 LOAD (+)		-4.50	*63.	*6.	-1.17	*0.06	*1.23
+2 LOAD (-)		-4.50	62.	4.	1.15	0.00	1.20
+9X LOAD (+)		-4.50	-338.	-0.	-6.24	-0.02	-6.56
+9X LOAD (-)		-4.50	340.	215.	6.29	0.02	6.59
POSITIVE LOAD	2000	346.	0.	223.	6.39	0.02	6.70
NEGATIVE LOAD	-2000	-344.	-0.	-222.	-6.35	-0.02	-6.67

TABLE 6 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT S-IVB/SEGMENT SEPARATION
 S-IVB STAGE PROPULSION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE **		PITCH (DEG)	ROLL (DEG)	YAW (DEG/S)	** VEHICLE ATTITUDE RATE RROLL (DEG/S)
		PITCH (DEG)	ROLL (DEG)				
NOMINAL	141.70	-62.720	-0.074	-0.005	-0.010	0.003	-0.003
LH2 LEADING (+)	5.00	0.000	0.000	0.000	0.000	0.000	0.000
LH2 LEADING (-)	5.00	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
LBX LEADING (+)	0.00	0.001	0.000	0.000	0.001	0.000	0.000
LBX LEADING (-)	0.00	-0.001	-0.000	-0.000	-0.002	-0.000	-0.000
POSITIVE RSS	0.00	0.001	0.000	0.000	0.001	0.000	0.000
NEGATIVE RSS	-0.00	-0.001	-0.000	-0.000	-0.002	-0.000	-0.000

TABLE 6 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSSION ANALYSIS
 TRAJECTORY DISPERSIONS AT STAGE-IV SEPARATION,
 STAGE PROPULSION, THREE-SIGN DEVIATIONS

VARIATION	FLIGHT TIME (SEC)	SUBSTIC LATITUDE (DEG)	LATITUDE WEST (DFG)	EARTH FIXED VELOCITY (M/S)		EARTH FIXED PATH ANGLE (DEG)		CENTRAL RANGE ANGLE (DFG)	
				EARTH FIXED VELOCITY WEST (DFG)	EARTH FIXED VELOCITY NORTH (DFG)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED VELOCITY AZIMUTH (DEG)	EARTH FIXED PATH ANGLE (DEG)	CENTRAL RANGE ANGLE (DFG)
INITIAL	141.70	28.597	79.679	255.950	61.293	83.204	1.142	-0.030	-0.000
LH2 LOAD 1,3 (+)	3.00	-0.000	0.000	-1.63	0.013	-0.030	0.000	0.000	0.000
LH2 LOAD 1,3 (-)	3.00	0.000	-0.000	1.63	-0.013	0.030	-0.000	-0.001	-0.002
LOX LOAD 1,3 (+)	3.00	-0.000	0.000	-8.72	0.069	-0.081	0.001	0.001	0.002
LOX LOAD 1,3 (-)	3.00	0.000	-0.000	8.78	-0.076	0.076	-0.001	-0.001	-0.002
POSITIVE R33	0.00	0.000	0.000	8.92	0.071	0.071	0.002	0.002	0.002
NEGATIVE R33	0.00	-0.000	-0.000	-8.87	-0.071	-0.071	-0.001	-0.002	-0.002

TABLE 7

AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPARATION

S-IVB STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	SPACE FIXED FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED AZIMUTH (DEG)	VEHICLE WEIGHT (LB)
NOMINAL	141.70	60337.	2427.28	65.949	67298.	84.466	404447.
NON-PROPELLANT MASS (+)	C. CC	-35.	-0.89	0.008	-22.	0.000	200.
NON-PROPELLANT MASS (-)	C. CC	36.	0.89	-0.008	22.	-0.000	-200.
POSITIVE RSS	C. CC	36.	0.89	0.008	22.	0.000	200.
NEGATIVE RSS	-0. CC	-35.	-0.89	-0.008	-22.	-0.000	-200.

TABLE 7 (Cont'd)

AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT S-IB/S-IVB SEPARATION
 S-IVB STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR **			** SPACE FIXED VELOCITY VECTOR **		
		X	Y	Z	XDOT	YDOT	ZDOT
NOMINAL	141.7C	6432357.	24946.	125771.	945.57	43.53	2235.11
NON-PROPELLENT MASS (+)	C.CC	-35.	0.	-23.	-0.64	0.00	-0.69
NON-PROPELLENT MASS (-)	C.CC	35.	-0.	23.	0.64	-0.00	0.69
POSITIVE RSS	C.CC	35.	0.	23.	0.64	0.00	0.69
NEGATIVE RSS	-C.CC	-35.	-0.	-23.	-0.64	-0.00	-0.69

TABLE 7 (Cont'd)

AS-2C1 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-1B/S-IVB SEPARATION
S-IVB STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	•* EARTH FIXED POSITION VECTOR **			** EARTH FIXED VELOCITY VECTOR XDOT YDOT ZDOT	
		X (M)	Y (M)	Z (M)		
NOMINAL	141.70	59979.	93.	67913.	97C.74	4.57
NON-PROPELLANT MASS (+)	C.CC	-35.	-0.	-23.	-C.65	-0.CC
NON-PROPELLANT MASS (-)	C.CC	35.	0.	23.	0.65	0.CC
POSITIVE RSS	C.CC	35.	0.	23.	C.65	0.CC
NEGATIVE RSS	-0.00	-35.	-0.	-23.	-0.65	-0.00

TABLE 7 (Cont'd)

AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT S-IVB/S-IVB SEPARATION
 S-IVB STAGE NO-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE **			** VEHICLE ATTITUDE RATE (DEG/S)	ROLL (DEG)	PITCH (DEG)	YAW (DEG)	ROLL (DEG/S)	PITCH (DEG/S)	YAW (DEG/S)
		PITCH	ROLL	YAW							
NONFINAL	141.70	-62.720	-0.074	-0.005	-0.010	0.003	-0.003	0.000	0.000	0.000	-0.003
NON-PROPELLANT MASS (+)	C.C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NON-PROPELLANT MASS (-)	C.C	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
POSITIVE RSS	C.C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
NEGATIVE RSS	-C.0	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000

TABLE 7 (Cont'd)

AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT S-IVB/S-IVB SEPARATION

S-IVB STAGE VCN-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE		EARTH FIXED PATH ANGLE		EARTH FIXED VELOCITY AZIMUTH		CENTRAL RANGE ANGLE (DEG)
		LONGITUDE POSITIVE WEST	VELLCITY (LEG) (DEG)	ANGLE (DEG)	VELOCITY (M/S)	AZIMUTH (DEG)		
NOMINAL	141.7C	28.597	79.879	2059.50	61.293	83.204	1.142	
NON-PROPELLANT MASS (+)	C.CC	-0.00C	0.000	-0.91	0.007	-0.00C	-0.000	
NON-PROPELLANT MASS (-)	C.CC	0.00C	-0.000	0.91	-0.007	0.00C	0.000	
PUSHITIVE RSS	C.CC	0.00C	0.000	0.91	C.CC7	0.00C	0.000	
NEGATIVE RSS	-0.00	-0.00C	-0.000	-0.91	-0.007	-0.00C	-0.000	

TABLE 8

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
 COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS

DISPERSION GROUP		FLIGHT TIME (SEC)	ALTITUDE (M)	VELOCITY (M/S)	SPACE FIXED PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED VELOCITY AZIMUTH (DEG)	VEHICLE WEIGHT (LB)
S-IB Propulsion	+RSS	6.29	1476.	17.05	2.288	7264	0.032	3167.
S-IB Propulsion	-RSS	2.66	1246.	20.74	1.233	2589.	0.006	1902.
S-IB Non Propulsion	+RSS	0.00	1530.	29.70	1.436	2965.	1.712	310.
S-IB Non Propulsion	-RSS	0.00	1538.	27.97	1.432	2662.	1.738	310.
S-IVB Propulsion	+RSS	0.00	348.	8.70	0.077	217.	0.003	1960.
S-IVB Propulsion	-RSS	0.00	346.	8.66	0.077	217.	0.003	1959.
S-IVB Non Propulsion	+RSS	0.00	36.	0.89	0.008	22..	0.000	200.
S-IVB Non Propulsion	-RSS	0.00	35.	0.89	0.008	22..	0.000	200.
Combined Positive	RSS *	6.29	2155.	35.35	2.702	7849.	1.712	3743.
Combined Negative	RSS	2.66	1997.	35.89	1.891	3720.	1.738	2755.

* Deviation restricted to 5.75 sec. by LVDC backup signal for OECO.

TABLE 8 (Cont'd.)

**AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS**

DISPERSION GROUP	FLIGHT TIME (SEC)	SPACE FIXED POSITION VECTOR			SPACE FIXED VELOCITY VECTOR XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
		X (M)	Y (M)	Z (M)			
S-IB Propulsion	+RSS	6.29	1535.	283.	9886.	48.17	0.28
S-IB Propulsion	-RSS	2.66	1359.	121.	3666.	94.00	0.36
S-IB Non Propulsion	+RSS	0.00	1559.	3070.	2976.	49.26	66.62
S-IB Non Propulsion	-RSS	0.00	1571.	3206.	2676.	50.62	67.59
S-IVB Propulsion	+RSS	0.00	343.	0.	226.	6.31	0.02
S-IVB Propulsion	-RSS	0.00	342.	0.	226.	6.27	0.02
S-IVB Non Propulsion	+RSS	0.00	35.	0.	23.	0.64	0.00
S-IVB Non Propulsion	-RSS	0.00	35.	0.	23.	0.64	0.00
Combined Positive	RSS	6.29	2215.	3083.	10327.	69.19	66.62
Combined Negative	RSS	2.66	2105	3208.	4544.	106.92	67.59
							55.83

TABLE 8 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
 COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS

DISPERSION GROUP	FLIGHT TIME (SEC)	EARTH FIXED POSITION VECTOR			EARTH FIXED VELOCITY VECTOR	
		X (M)	Y (M)	Z (M)	XDOT (M/S)	YDOT (M/S)
S-IB Propulsion	+RSS	6.29	1497.	27.	7324.	47.45
S-IB Propulsion	-RSS	2.66	1275.	9.	2603.	92.33
S-IB Non Propulsion	+RSS	0.00	1545.	3069.	2984.	48.78
S-IB Non Propulsion	-RSS	0.00	1556.	3208.	2683.	50.15
S-IVB Propulsion	+RSS	0.00	346.	0.	223.	6.39
S-IVB Propulsion	-RSS	0.00	344.	0.	222.	6.35
S-IVB Non Propulsion	+RSS	0.00	35.	0.	23.	0.65
S-IVB Non Propulsion	-RSS	0.00	35.	0.	23.	0.65
Combined Positive	RSS	6.29	2179.	3069.	7912.	68.35
Combined Negative	RSS	2.66	2041.	3208.	3745.	105.26
						67.61
						56.31

TABLE 8 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
 COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS

DISPERSION GROUP	FLIGHT TIME (SEC)	VEHICLE ATTITUDE			(1) VEHICLE ATTITUDE RATE	
		PITCH (DEG)	YAW (DEG)	ROLL (DEG)	PITCH (DEG/S)	YAW (DEG/S)
S-IB Propulsion	+RSS	6.29	0.141	0.002	0.023	---
S-IB Propulsion	-RSS	2.66	0.074	0.011	0.011	---
S-IB Non Propulsion	+RSS	0.00	1.535	1.523	5.838	---
S-IB Non Propulsion	-RSS	0.00	1.537	1.523	5.837	---
S-IVB Propulsion	+RSS	0.00	0.001	0.000	0.000	---
S-IVB Propulsion	-RSS	0.00	0.001	0.000	0.000	---
S-IVB Non Propulsion	+RSS	0.00	0.000	0.000	0.000	---
S-IVB Non Propulsion	-RSS	0.00	0.000	0.000	0.000	---
<hr/>						
Combined Positive	RSS	6.29	1.541	1.523	5.838	---
<hr/>						
Combined Negative	RSS	2.66	1.539	1.523	5.837	---
<hr/>						

- (1) The S-IB stage attitude rates have been omitted in order that more realistic values, reflecting conditions at physical separation, can be determined. These data will be published at a later date.

TABLE 8 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT S-IB/S-IVB SEPARATION
COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS

DISPERSION GROUP	FLIGHT TIME (SEC)	GEOGRAPHIC LATITUDE (DEG)	LONGITUDE POS. WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (PER.)		CENTRAL RANGE ANGLE (PER.)
					EARTH FIXED PATH ANGLE (PER.)	EARTH FIXED VELOCITY (M/S)	
S-IB Propulsion	+RSS	6.29	0.008	0.026	16.80	2.690	0.063
S-IB Propulsion	-RSS	2.66	0.003	0.074	22.20	1.457	0.021
S-IB Non Propulsion	+RSS	0.00	0.028	0.028	26.76	1.733	2.101
S-IB Non Propulsion	-RSS	0.00	0.028	0.030	24.66	1.727	2.132
S-IVB Propulsion	+RSS	0.00	0.000	0.002	8.92	0.071	0.001
S-IVB Propulsion	-RSS	0.00	0.000	0.002	8.87	0.071	0.001
S-IVB Non Propulsion	+RSS	0.00	0.000	0.000	0.91	0.007	0.000
S-IVB Non Propulsion	-RSS	0.00	0.000	0.000	0.91	0.007	0.000
Combined Positive	RSS	6.29	0.029	0.038	32.84	3.201	2.102
Combined Negative	RSS	2.66	0.028	0.080	34.36	2.261	2.132
							0.092
							0.011

TABLE 9
AS-207 LAUNCH VEHICLE TRAJECTORY CISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS						
VARIATIONS	FLIGHT TIME (SEC)	ALITUDE (M)	SPACE FIXED VELOCITY (M/S)	SPACE FIXED FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED VELOCITY AZIMUTH (DEG)
NOMINAL	593.21	192487.	7187.09	90.007	1785246.	94.029
HIGH SURF. WIND +LOX(P)	0.79	0.	0.00	-0.000	3302.	0.018
LOW SURF. -WIND -LOX(P)	-0.54	-2.	0.00	-0.000	-1987.	-0.011
HIGH AMB. TEMP. +FUEL(P)	-1.55	4.	-0.00	-0.000	-3901.	-0.022
LOW AMB. TEMP. -FUEL(P)	7.53	-3.	0.00	0.001	11718.	0.072
PRPT. LOADING MASS + LOX	-0.03	-4.	0.00	-0.001	2797.	0.013
PRPT. LOADING MASS - LOX	0.04	0.	-0.00	0.000	-2659.	-0.013
PRPT. LOADING MASS + FUEL	0.29	-2.	-0.00	-0.000	-591.	-0.002
PRPT. LOADING MASS - FUEL	-0.29	2.	0.00	-0.000	590.	0.002
THRUST AND FLOWRATE (+)	-2.91	-2.	-0.00	-0.001	-4755.	-0.029
THRUST AND FLOWRATE (-)	3.61	-6.	0.00	-0.000	5034.	0.032
ISP AND FLOWRATE (+,-)	-0.05	0.	0.00	-0.000	2249.	0.011
ISP AND FLOWRATE (-,+)	0.04	0.	-0.00	0.000	-2219.	-0.011
E.M.R. LOX BIAS	0.41	-2.	-0.00	-0.000	-2405.	-0.011
E.M.R. FUEL BIAS	C.28	-1.	-0.00	-0.000	-1616.	-0.007
H-1 ENGINE THRUST DECAY (+)	-0.06	0.	0.00	-0.000	137.	0.001
H-1 ENGINE THRUST DECAY (-)	0.06	-0.	0.00	-0.001	-134.	-0.001
POSITIVE RSS	8.40	5.	0.00	0.001	13658.	0.083
NEGATIVE RSS	-3.36	-9.	-0.00	-0.002	-174.1	-0.043
						-1070.

TABLE 9(Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC.)	** SPACE FIXED POSITION VECTOR **			** SPACE FIXED VELOCITY VECTOR **		
		X (M)	Y (M)	Z (M)	XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	593.21	6236428.	70133.	2052058.	-2435.83	148.99	1394.82
HIGH SURF. WIND +LOX(ρ)	0.79	-1167.	71.	3545.	-4.19	-6.05	-1.38
LOW SURF. WIND -LOX(ρ)	-0.54	708.	-43.	-2160.	2.60	0.06	0.86
HIGH AMB. TEMP. +FUEL (ρ)	-1.55	1462.	-89.	-4434.	5.29	0.05	1.74
LOW AMB. TEMP. -FUEL (ρ)	7.53	-4780.	291.	14460.	-17.26	-0.13	-5.10
PRPT. LOADING MASS + LOX	-C.03	-885.	54.	2672.	-3.08	-6.93	-1.01
PRPT. LOADING MASS - LOX	C.04	851.	-52.	-2587.	3.05	0.04	1.00
PRPT. LOADING MASS + FUEL	C.29	150.	-9.	-462.	0.60	0.01	0.20
PRPT. LOADING MASS - FUEL	-C.29	-150.	9.	461.	-0.16	0.00	-0.16
THRUST AND FLOWRATE (+)	-2.91	1908.	-117.	-5815.	7.04	0.09	2.31
THRUST AND FLOWRATE (-)	3.61	-2103.	128.	6362.	-7.52	-0.08	-2.48
ISP AND FLOWRATE (+,-)	-C.05	-717.	44.	2179.	-2.57	-0.02	-0.85
ISP AND FLOWRATE (-,+)	C.04	710.	-43.	-2157.	2.54	0.03	0.84
E.M.R. LOX BIAS	0.41	718.	-44.	-2189.	2.62	0.04	0.86
E.M.R. FUEL BIAS	C.28	481.	-30.	-1465.	1.79	0.07	0.59
H-1 ENGINE THRUST DECAY (+)	-C.06	-36.	2.	111.	-0.12	0.01	-0.04
H-1 ENGINE THRUST DECAY (-)	C.06	35.	-2.	-108.	0.22	0.00	0.07
POSITIVE RSS	8.40	2837.	334.	16561.	10.36	0.12	3.40
NEGATIVE RSS	-3.36	-5474.	-173.	-8631.	-19.70	-0.21	-6.51

TABLE 9 (Cont'd)

AS-201 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR **			** EARTH FIXED VELOCITY VECTOR XDOT YDOT ZDOT (M/S)
		X (M)	Y (M)	Z (M)	
NOMINAL	593.21	-63028.	62540.	1814136.	-2036.08
HIGH SURF. WIND +LOX(P)	0.79	-939.	161.	3265.	-3.65
LOW SURF. -WIND -LOX(P)	-0.54	563.	-99.	-1966.	0.29
HIGH AMB. TEMP. +FUEL(P)	-1.55	1112.	-208.	-3857.	-1.06
LOW AMB. TEMP. -FUEL(P)	7.53	-3346.	714.	11581.	0.66
PRPT. LOADING MASS + LOX	-0.03	-786.	113.	2716.	2.25
PRPT. LOADING MASS - LOX	0.04	756.	-110.	-2631.	-0.18
PRPT. LOADING MASS + FUEL	0.29	166.	-16.	2.93	4.36
PRPT. LOADING MASS - FUEL	-0.29	-166.	16.	-585.	-0.50
THRUST AND FLOWRATE (+)	-2.91	1349.	-284.	-4702.	1.28
THRUST AND FLOWRATE (-)	3.61	-1439.	317.	4975.	-3.89
ISP AND FLOWRATE (+,-)	-0.05	-640.	92.	2225.	-0.85
ISP AND FLOWRATE (-,+)	0.04	631.	-91.	-2196.	0.05
E.M.R. LOX BIAS	C.41	682.	-88.	-2381.	-0.04
E.M.R. FUEL BIAS	0.28	457.	-59.	-1594.	0.77
H-1 ENGINE THRUST DECAY (+)	-0.06	-39.	4.	1.84	0.06
H-1 ENGINE THRUST DECAY (-)	C.06	38.	-4.	-132.	0.53
POSITIVE RSS	8.40	2199.	811.	13499.	0.04
NEGATIVE RSS	-3.36	-3900.	-403.	-757.	-0.04
				-15.22	0.01
				-1.05	0.07
				-4.51	2.55

TABLE 9(Cont'd)

AS-201 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
S-1B STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC.)	** VEHICLE ATTITUDE **			** VEHICLE ATTITUDE RATE (DEG/S)
		PITCH (DEG)	ROLL (DEG)	YAW (DEG)	
NOMINAL	593.21	-104.480	0.612	-0.105	-0.003
HIGH SURF. WIND +LOX(ρ)	C.79	-0.338	-0.007	0.130	0.000
LOW SURF. WIND -LOX(ρ)	-C.54	0.326	0.005	-0.727	0.000
HIGH AMB. TEMP. +FUEL(ρ)	-1.55	0.671	0.002	-0.057	0.000
LOW AMB. TEMP. -FUEL(ρ)	7.53	-2.286	0.002	-0.484	0.001
PRPT. LOADING MASS + LOX	-0.03	0.125	-0.023	-0.735	0.002
PRPT. LOADING MASS - LOX	0.04	-0.04	0.004	0.358	0.000
PRPT. LOADING MASS + FUEL	0.29	-0.014	0.002	-0.012	0.001
PRPT. LOADING MASS - FUEL	-0.29	0.130	-0.010	-0.760	0.002
THRUST AND FLOWRATE (+)	-2.91	1.513	-0.010	-0.767	0.001
THRUST AND FLOWRATE (-)	3.61	-1.191	-0.006	-0.647	0.003
- ISP AND FLOWRATE (+,-)	-0.05	0.022	-0.006	-0.655	0.000
O- ISP AND FLOWRATE (-,+)	0.04	-0.026	0.002	0.338	0.000
E.M.R. LOX BIAS	0.41	-0.051	0.006	0.051	0.001
E.M.R. FUEL BIAS	0.28	0.005	0.003	-0.013	0.001
H-1 ENGINE THRUST DECAY (+)	-0.06	0.013	-0.005	-0.597	0.000
H-1 ENGINE THRUST DECAY (-)	0.06	0.104	0.002	-0.026	0.004
PUSITIVE RSS	8.40	1.700	0.010	0.512	0.006
NEGATIVE RSS	-3.36	-2.600	-0.029	-1.804	-0.000

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TABLE 9(Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC.)	GEODETIC LATITUDE (DEG.)	LONGITUDE POSITIVE WEST (DEG.)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG.)	EARTH FIXED W/LOCITY AZIMUTH (DEG.)	CENTRAL RANGE ANGLE (DEG.)
							S-IB STAGE PROPULSION THREE SIGMA DEVIATIONS
NOMINAL	593.21	28.753	62.287	7367.79	90.007	94.259	18.239
HIGH SURF. WIND +LOX(P)	0.79	-0.002	-0.034	0.00	-0.000	0.019	0.033
LOW SURF. IND -LOX(P)	-0.54	0.001	0.020	-0.00	-0.000	-0.011	-0.020
HIGH AMB. TEMP. +FUEL(P)	-1.55	0.003	0.040	-0.00	-0.000	-0.023	-0.041
LOW AMB. TEMP. -FUEL(P)	7.53	-0.009	-0.120	0.00	0.001	0.076	0.133
PRPT. LOADING MASS + LOX	-0.03	-0.002	-0.028	0.00	-0.001	0.014	0.025
PRPT. LOADING MASS - LOX	0.04	0.002	0.027	-0.00	0.000	-0.014	-0.024
PRPT. LOADING MASS + FUEL	0.29	0.000	0.006	0.00	-0.000	-0.002	-0.004
PRPT. LOADING MASS - FUEL	-0.29	-0.000	-0.006	0.00	-0.000	0.003	0.004
THRUST AND FLOWRATE (+)	-2.91	0.004	0.049	-0.00	-0.001	-0.031	-0.053
THRUST AND FLOWRATE (-)	3.61	-0.004	-0.051	0.00	-0.000	0.034	0.058
ISP AND FLOWRATE (+,-)	-0.05	-0.001	-0.023	0.00	-0.000	0.012	0.020
ISP AND FLOWRATE (-,+)	0.04	0.001	0.023	-0.00	0.000	-0.011	-0.020
E.M.R. LOX BIAS	0.41	0.001	0.025	-0.00	-0.000	-0.012	-0.020
E.M.R. FUEL BIAS	0.28	0.001	0.016	-0.00	-0.000	-0.008	-0.013
H-1 ENGINE THRUST DECAY (+)	-0.06	-0.000	-0.001	0.00	-0.000	0.001	0.001
H-1 ENGINE THRUST DECAY (-)	0.06	0.000	0.001	0.00	-0.001	-0.001	-0.001
PUSITIVE RSS	8.40	0.006	0.078	0.00	0.001	0.088	0.152
NEGATIVE RSS	-3.36	-0.011	-0.139	-0.00	-0.002	-0.046	-0.079

TABLE 10

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS

TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-16 STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	SPACE FIXED FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED AZIMUTH (DEG)	VEHICLE WEIGHT (LB)
NOMINAL	593.21	192487.					70778.
NON-PROPELLANT MASS (+)	0.09	-1.	0.00	-0.001	-186.	-0.001	-41.
NON-PROPELLANT MASS (-)	-0.09	0.	0.00	-0.000	187.	0.001	41.
THRUST MIS. + PITCH	-0.17	-4.	-0.00	0.000	88C.	0.044	-74.
THRUST MIS. - PITCH	0.13	2.	0.00	-0.001	-8981.	-0.044	-55.
THRUST MIS. + YAW	0.40	-2.	0.00	-0.000	-225.	-0.002	-174.
THRUST MIS. - YAW	0.00	0.	0.00	0.000	114.	0.002	-2.
THRUST MIS. + ROLL	0.01	-0.	-0.00	0.000	-5.	-0.000	-3.
THRUST MIS. - ROLL	-0.01	0.	0.00	-0.000	46.	0.000	4.
AXIAL FORCE COEFF. (+)	1.00	-6.	-0.00	0.000	-1887.	-0.007	-428.
AXIAL FORCE COEFF. (-)	-0.97	-4.	-0.00	-0.001	1792.	0.007	425.
C.G. OFFSET (-Z)	-0.03	-0.	0.00	0.000	2514.	0.012	14.
C.G. OFFSET (+Z)	0.05	1.	0.00	-0.001	-2529.	-0.012	-23.
C.G. JFFSET (-Y)	-0.03	0.	-0.00	-0.000	17.	0.000	14.
C.G. JFFSET (+Y)	0.06	-0.	0.00	-0.001	-24.	-0.000	-28.
HEADWIND	0.62	-3.	0.00	-0.001	-3898.	-0.018	-273.
TAILWIND	-0.85	-6.	-0.00	-0.001	5260.	0.024	373.
RIGHT CROSS WIND	0.38	-2.	-0.00	-0.000	-1511.	-0.007	-168.
LEFT CROSS WIND	0.27	-1.	0.00	-0.000	-1367.	-0.006	-118.
MAXIMUM ATMOSPHERE	0.21	-1.	0.00	-0.001	-367.	-0.001	-92.
MINIMUM ATMOSPHERE	-0.39	2.	0.00	-0.001	655.	0.002	171.
POSITIVE RSS	1.33	3.	0.00	0.000	10795.	0.052	593.
NEGATIVE RSS	-1.35	-10.	-0.00	-0.003	-10407.	-0.050	-585.

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
S-IB STAGE NCN-PROPULSION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR **			** SPACE FIXED VELOCITY VECTOR **		
		X (M)	Y (M)	Z (M)	XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	593.21	6236428.	70133.	2052058.	-2435.83	148.99	7394.82
NON-PROPELLANT MASS (+)	0.09	47.	-3.	-145.	C.25	0.00	0.08
NON-PROPELLANT MASS (-)	-0.09	-48.	3.	146.	-C.16	-0.00	-0.05
THRUST MIS. + PITCH	0.17	-2890.	176.	8752.	-1G.39	-0.12	-3.43
THRUST MIS. - PITCH	0.13	2871.	-176.	-8739.	1G.52	0.12	3.45
THRUST MIS. + YAW	0.40	18.	-3.	-62.	C.11	-0.20	0.04
THRUST MIS. - YAW	0.00	-37.	4.	113.	-C.14	0.19	-0.05
THRUST MIS. + ROLL	0.01	0.	-0.	-2.	-C.01	-0.01	-0.01
THRUST MIS. - ROLL	-0.01	-14.	1.	42.	-C.C5	0.02	-0.02
AXIAL FORCE COEF. (+)	1.00	471.	-29.	-1450.	1.72	0.02	0.57
AXIAL FORCE COEF. (-)	-0.97	-454.	28.	1365.	-1.51	-0.02	-0.50
C.G. OFFSET (-Z)	-0.03	-806.	49.	2446.	-2.91	-0.03	-0.96
C.G. OFFSET (+Z)	0.05	807.	-49.	-2453.	3.C3	0.04	1.00
C.G. OFFSET (-Y)	-0.03	-1.	0.	4.	-C.CC	-0.05	-0.00
C.G. OFFSET (+Y)	0.06	-1.	-0.	2.	C.10	-0.05	0.03
HEADWIND	0.62	1170.	-72.	-3566.	4.34	0.05	1.43
TAILWIND	-0.85	-1589.	97.	4805.	-5.63	-0.06	-1.86
RIGHT CROSS WIND	0.38	434.	-27.	-1326.	1.61	-0.04	0.53
LEFT CROSS WIND	0.27	403.	-24.	-1230.	1.51	0.07	0.49
MAXIMUM ATMOSPHERE	0.21	90.	-6.	-276.	0.39	0.00	0.13
MINIMUM ATMOSPHERE	-0.39	-157.	10.	485.	-0.50	-0.00	-0.16
POSITIVE RSS	1.33	3269.	209.	10383.	12.02	0.25	3.95
NEGATIVE RSS	-1.35	-3429.	-200.	-953.	-12.28	-0.25	-4.05

TABLE 10 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY CISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
 S-1B STAGE ACN-PROPELLION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR			** EARTH FIXED VELOCITY VECTOR XDOT YDOT ZDOT (M/S)		
		X (M)	Y (M)	Z (M)			
NOMINAL	593.21	-63028.	62540.	1814136.	-2036.08 C.29 -C.19 -C.87 1C.14 C.28 -C.13 -C.CC -C.C5 0.C1 0.C1 -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	1814136.	327.45 0.02 -0.02 0.24 -0.16 -0.C9 0.09 -0.19 -0.C1 -0.00 -0.01 0.59 -0.53 -0.81 0.84 -0.01 0.04 0.04 -0.03 0.C9 1.27 -1.66 0.49 0.45 0.13 0.13 -0.18
NON-PROPELLANT MASS (+)	0.09	52.	-5.	-184. 185. 5. 375. 375. -371. 1. 6. -0. 1. -13.	-2036.08 C.29 -C.19 -C.87 1C.14 C.28 -C.13 -C.CC -C.C5 0.C1 0.C1 -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	327.45 0.02 -0.02 0.24 -0.16 -0.C9 0.09 -0.19 -0.C1 -0.00 -0.01 0.59 -0.53 -0.81 0.84 -0.01 0.04 0.04 -0.03 0.C9 1.27 -1.66 0.49 0.45 0.13 0.13 -0.18	
NON-PROPELLANT MASS (-)	-0.09	-53.	5.	184. 185. 5. 375. 375. -371. 1. 6. -0. 1. -13.	-2036.08 C.29 -C.19 -C.87 1C.14 C.28 -C.13 -C.CC -C.C5 0.C1 0.C1 -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	327.45 0.02 -0.02 0.24 -0.16 -0.C9 0.09 -0.19 -0.C1 -0.00 -0.01 0.59 -0.53 -0.81 0.84 -0.01 0.04 0.04 -0.03 0.C9 1.27 -1.66 0.49 0.45 0.13 0.13 -0.18	
THRUST MIS. + PITCH	0.17	-2535.	2550.	8782.	-8887. -223. 112. -5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-8887. -223. 112. -5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
THRUST MIS. - PITCH	C.13	2550.	375.	-371. 1. 6. -0. 1. -13.	-8887. -223. 112. -5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-8887. -223. 112. -5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
THRUST MIS. + YAW	0.40	62.	6.	1.	-223. -112. -5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-223. -112. -5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
THRUST MIS. - YAW	C.00	-32.	-32.	1.	-112. -5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-112. -5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
THRUST MIS. + ROLL	0.01	1.	1.	-0.	-5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-5. 46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
THRUST MIS. - ROLL	-0.01	-13.	-13.	2.	46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	46. -1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
Axial Force Coeff. (+)	1.00	531.	531.	-49.	-1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
Axial Force Coeff. (-)	-0.97	-514.	-514.	46.	-1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-1870. -49. 46. 1773. 104. -2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
C.G. OFFSET (+ Z)	-0.03	-716.	-716.	-104.	-2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-2486. -2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
C.G. OFFSET (- Z)	0.03	719.	719.	-104.	-2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-2502. -0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	
HEADWIND	0.05	-5.	-5.	17.	17.	-0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39	-0.02 C.13 -0.22 -1.87 -2.81 0.C5 -0.03 -0.93 -0.02 -C.02 C.13 -0.03 0.C9 1.27 -0.12 0.01 0.10 0.05 0.05 -0.03 0. 0. -144. 1105. -1503. -0.85 -0.38 0.27 0.21 -0.39
TAILWIND	-0.03	6.	6.	0.	0. -24. -3858. 5202. -1496. -52. 428. 387. 103. 16.	0. -24. -3858. 5202. -1496. -52. 428. 387. 103. 16.	
RIGHT CROSS WIND	0.38	1105.	1105.	194.	194. -1353. -363. 648.	194. -1353. -363. 648.	
LEFT CROSS WIND	0.27	0.62	0.62	-49.	-49.		
MAXIMUM ATMOSPHERE	0.21	0.21	0.21	-9.	-9.		
MINIMUM ATMOSPHERE	-0.39	-0.39	-0.39	16.	16.		
POSITIVE RSS	1.33	2953.	438.	10676.	11.78 0.41 3.39		
NEGATIVE RSS	-1.35	-3082.	-418.	-10299.	-0.33 -3.45		

TABLE 10 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
S-1B STAGE ACA-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE **			PITCH (DEG)	ROLL (DEG)	YAW (DEG)	VEHICLE ATTITUDE RATE YAW (DEG/S)	ROLL (DEG/S)	PITCH (DEG/S)	YAW (DEG/S)
		PITCH (DEG)	ROLL (DEG)	YAW (DEG)							
NOMINAL	593.21	-104.480	0.612	-0.105	-0.003	-0.001	-0.475	0.003	0.000	-0.001	-0.060
NON-PROPELLANT MASS (+)	0.09	0.083	-0.001	0.475	0.000	0.000	0.000	0.000	0.000	0.000	0.104
NON-PROPELLANT MASS (-)	-0.09	-0.083	-0.002	-0.278	0.000	0.000	0.000	0.000	0.000	0.000	0.041
THRUST MIS. + PITCH	0.09	0.046	-0.002	0.199	0.002	0.002	0.000	0.000	0.000	0.000	0.053
THRUST MIS. - PITCH	-0.09	-0.046	-0.025	-0.451	0.003	0.003	0.000	0.000	0.000	0.000	0.064
THRUST MIS. + YAW	0.17	-1.477	-0.025	-1.832	-0.575	0.001	-0.575	0.000	-0.000	-0.000	-0.002
THRUST MIS. - YAW	-0.17	1.477	-0.029	1.795	0.197	-0.029	0.000	0.000	0.000	0.000	0.029
THRUST MIS. + ROLL	0.00	0.00	-0.004	-0.085	0.565	-0.000	0.000	0.000	0.000	0.000	0.087
THRUST MIS. - ROLL	-0.01	-0.013	-0.013	0.077	-0.740	0.000	-0.000	0.000	-0.000	-0.000	0.047
AXIAL FORCE COEF. (+)	1.00	-0.268	0.010	0.677	0.000	0.000	0.000	0.000	0.000	0.000	0.114
AXIAL FORCE COEF. (-)	-0.97	0.608	-0.022	-0.715	0.001	-0.000	-0.000	-0.000	-0.000	-0.000	0.045
C.G. OFFSET (-Z)	-0.03	-0.398	-0.008	-0.673	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.024
C.G. OFFSET (+Z)	0.05	0.497	-0.003	-0.770	0.004	-0.001	-0.001	-0.001	-0.001	-0.001	0.077
C.G. OFFSET (-Y)	-0.03	0.009	0.488	0.314	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.048
C.G. OFFSET (+Y)	0.06	0.104	-0.493	-0.573	0.003	-0.000	-0.000	-0.000	-0.000	-0.000	0.000
HEADWIND	0.62	0.249	0.015	-0.683	0.003	-0.001	-0.001	-0.001	-0.001	-0.001	0.034
TAILWIND	-0.85	0.068	-0.036	-0.760	0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.062
RIGHT CROSS WIND	0.38	0.044	-0.674	-0.781	0.001	-0.001	-0.001	-0.001	-0.001	-0.001	0.074
LEFT CROSS WIND	0.27	0.073	0.549	0.563	0.001	-0.000	-0.000	-0.000	-0.000	-0.000	0.119
MAXIMUM ATMOSPHERE	0.21	0.005	0.002	-0.106	0.002	-0.000	-0.000	-0.000	-0.000	-0.000	-0.007
MINIMUM ATMOSPHERE	-0.39	0.231	-0.007	0.225	0.003	0.000	0.000	0.000	0.000	0.000	0.077
POSITIVE RSS	1.33	1.852	1.942	1.308	0.001	0.001	0.001	0.001	0.001	0.001	0.262
NEGATIVE RSS	-1.35	-1.553	-2.016	-1.873	-0.000	-0.002	-0.002	-0.002	-0.002	-0.002	-0.008

TABLE 10 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-1B STAGE NCA-PROPULSION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITION WEST (CEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED VELOCITY AZIMUTH (DEG)	CENTRAL RANGE ANGLE (CEG)
NOMINAL	593.21	28.753	62.287	7367.79	90.007	94.259	18.239
NON-PROPELLANT MASS (+)	0.09	0.000	0.002	0.00	-0.001	-0.001	-0.001
NON-PROPELLANT MASS (-)	-0.09	-0.000	-0.002	0.00	-C.CC	0.001	0.001
THRUST MIS. + PITCH	0.17	-0.006	-0.091	0.00	0.000	0.046	0.080
THRUST MIS. - PITCH	0.13	0.006	0.092	-0.00	-0.001	-0.046	-0.0080
THRUST MIS. + YAW	C.40	0.000	0.002	-0.00	-0.000	-0.000	-0.001
THRUST MIS. - YAW	0.00	-0.000	-0.001	0.00	C.CC	0.002	0.001
THRUST MIS. + ROLL	0.01	0.000	0.000	0.00	0.000	-0.000	-0.000
THRUST MIS. - ROLL	-0.01	-0.000	-0.000	0.00	-0.000	0.000	0.000
AXIAL FORCE COEF. (+)	1.00	0.001	0.019	0.00	C.CC	-0.008	-0.013
AXIAL FORCE COEF. (-)	-0.97	-0.001	-0.018	0.00	-C.CC	0.007	0.013
C.G. OFFSET (-Z)	-0.03	-0.002	-0.026	0.00	0.000	0.013	0.022
C.G. OFFSET (+Z)	0.05	0.002	0.026	-0.00	-0.001	-0.013	-0.023
C.G. OFFSET (-Y)	-0.03	-0.000	-0.000	0.00	-0.000	0.000	0.000
C.G. OFFSET (+Y)	0.06	0.000	0.000	-0.00	-C.CC	-0.000	0.000
HEADWIND	0.62	0.002	0.040	-0.00	-0.001	-0.019	-0.033
TAILWIND	-0.85	-0.003	-0.054	0.00	-0.001	0.025	0.044
RIGHT CROSS WIND	0.38	0.001	0.015	-0.00	-0.001	-0.007	-0.012
LEFT CROSS WIND	0.27	0.001	0.014	0.00	-C.CC	-0.006	-0.011
MAXIMUM ATMOSPHERE	0.21	0.000	0.004	0.00	-0.001	-0.003	-0.003
MINIMUM ATMOSPHERE	-0.39	-0.000	-0.007	0.00	-0.001	0.003	0.004
POSITIVE RSS	1.33	0.007	0.107	0.00	C.CC	0.055	0.095
NEGATIVE RSS	-1.35	-0.007	-0.110	-0.00	-0.003	-0.053	-0.091

TABLE II
AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
S-IVB STAGE PROPULSION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	SPACE FIXED FLIGHT PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED VELOCITY AZIMUTH (DEG)	VEHICLE WEIGHT (LB)
NOMINAL	593.21	192487.	7787.09	90.007	1785246.	94.029	70778.
THRUST AND FLOW RATE (+)	+14.24	12.	-0.00	+0.001	-50017.	-0.273	560.
THRUST AND FLOW RATE (-)	15.55	+13.	-0.00	+0.001	54936.	+0.300	-625.
ISP AND FLOW RATE (+,+)	1.62	-1.	-0.00	-0.000	7959.	+0.042	715.
ISP AND FLOW RATE (-,-,+)	-1.66	1.	-0.00	+0.000	7703.	+0.041	-691.
E.M.R. SHIFT (+)	-6.59	15.	-0.00	+0.001	-32241.	-0.171	-31.
E.M.R. SHIFT (-)	6.56	+6.	-0.00	+0.001	28712.	+0.153	+49.
LH2 LOADING (+)	6.57	+5.	0.00	+0.001	27832.	+0.149	+10.
LH2 LOADING (-)	+6.43	14.	-0.00	+0.000	-29692.	-0.158	-41.
LOX LOADING (+)	-1.88	5.	-0.00	+0.000	-17307.	+0.088	57.
LOX LOADING (-)	2.37	2.	-0.00	+0.001	17332.	+0.090	+125.
POSITIVE RSS	18.34	24.	0.00	0.002	70574.	0.381	910.
NEGATIVE RSS	+17.14	+15.	-0.00	+0.001	-69149.	-0.372	+942.

TABLE II (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSION AT J-2 FAIRING CUTOFF SIGNAL
 S-IV, STAGE PRECISION THREE-SIGMA DEVIATIONS

VARIATION	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR **			** SPACE FIXED VELOCITY VECTOR **		
		X (")	Y (")	Z (")	XDET M/S	YDET M/S	ZDET M/S
NOMINAL	536.21	623 6428.	701 33.	205 2058	-2435.83	148.99	734.82
THRUST AND FLOW RATE (+)	+1.024	17764.	-1103.	-54680.	64.94	0.69	21.09
THRUST AND FLOW RATE (-)	+15.95	-20048.	1204.	59839.	-71.06	-0.75	-23.80
ISP AND FLOW RATE (+,+)	1.092	-2786.	170.	8432.	-9.99	-0.09	*3.30
ISP AND FLOW RATE (-,-,+)	+1.066	2697.	-165.	-3200.	9.71	0.10	3.19
E-100 SHIFT (+)	+6.059	11178.	-669.	-34192.	40.65	0.46	13.27
E-100 SHIFT (-)	+6.056	-10197.	618.	30676.	-36.52	-0.39	*12.14
LH2 LEADING (+)	+6.57	-20910.	600.	29819.	-35.50	-0.38	*11.80
LH2 LEADING (-)	+5.043	10348.	-538.	-31631.	37.59	0.42	12.28
LHX LEADING (+)	+1.088	5805.	-356.	-17686.	21.02	0.23	6.89
LHX LEADING (-)	+2.37	-5922.	360.	17893.	-21.32	-0.22	*7.06
POSITIVE RSS		18.34	24260.	1533.	76172.	88.43	0.97
NEGATIVE RSS		+17.14	-25435.	-1651.	-74428.	*90.54	-0.96

TABLE II (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
 S-IVB STAGE PROPULSION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR			** EARTH FIXED VELOCITY VECTOR		
		X (M)	Y (M)	Z (M)	XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	59.3 21	-63.028.	62.540.	181436.	*203.608	327.45	7073.30
THRUST AND FLOW RATE (+)	*14.24	14063.	*2479.	*49514.	55.71	*5.00	16.05
THRUST AND FLOW RATE (-)	15.55	-15893.	2777.	54253.	*61.04	5.45	*18.13
ISP AND FLOW RATE (+,+)	1.62	*22273.	380.	7870.	*8.83	0.63	*2.58
ISP AND FLOW RATE (+,-,+)	*1.66	2190.	*370.	*7619.	8.54	*0.63	2.48
E.M.R. SHIFT (+)	*6.59	9117.	*1530.	*31904.	35.94	*2.49	10.37
E.M.R. SHIFT (-)	6.56	*8247.	1396.	28374.	*32.01	2.42	*9.42
LH2 LOADING (+)	6.57	*7992.	1359.	27505.	*31.04	2.40	*9.13
LH2 LOADING (-)	*6.43	8402.	*1420.	*29380.	33.07	*2.40	9.56
LOX LOADING (+)	*1.88	4911.	*775.	*17123.	19.28	*0.87	5.57
LOX LOADING (-)	2.37	*4958.	793.	17136.	*19.35	1.04	*5.65
POSITIVE RSS	18.34	19503.	3504.	69717.	77.03	6.54	22.22
NEGATIVE RSS	*17.14	-20352.	*3353.	*68439.	*78.52	*6.18	*23.22

TABLE 11 (Cont'd)

AS-PILOT LANDING VEHICLE TRAJECTORY SIGNATURE ANALYSIS
TRAJECTORY DISPARITIES AT J-2 FUEL CUTOFF SIGNAL
5-IV: STAGE SEPARATION THREE-STAGE DEVIATIONS

VARIATION	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE **			PITCH (DEG)	ROLL (DEG)	PITCH (DEG/S)	ROLL (DEG/S)	** VEHICLE ATTITUDE RATE **	ROLL (DEG/S)
		PITCH (DEG)	YAW (DEG)	PITCH (DEG/S)						
NOMINAL	593.21	-104.480	0.612	-0.105	-0.393	-0.393	-0.001	-0.001	-0.000	-0.000
THRUST AND FLOW RATE (+)	+14.24	0.434	-0.165	-0.308	-0.322	-0.179	-0.695	-0.208	-0.001	-0.001
THRUST AND FLOW RATE (-)	-15.55	-0.127	0.227	-0.277	-0.26	-0.226	-0.635	-0.277	-0.001	-0.001
ISP AND FLOW RATE (+,+)	+1.62	0.026	-0.063	-0.063	-0.523	-0.663	-0.631	-0.248	-0.000	-0.000
ISP AND FLOW RATE (-,-,+)	+1.62	0.026	-0.063	-0.063	-0.523	-0.663	-0.631	-0.248	-0.000	-0.000
EARTH SHIFT (+)	+6.52	-0.816	0.866	-0.303	-0.303	-0.303	-0.233	-0.044	-0.000	-0.000
EARTH SHIFT (-)	-6.52	-0.816	0.866	-0.303	-0.303	-0.303	-0.233	-0.044	-0.000	-0.000
LH2 LEADINg (+)	+6.57	-0.806	0.866	-0.301	-0.301	-0.301	-0.233	-0.044	-0.000	-0.000
LH2 LEADINg (-)	-6.43	-0.486	-0.372	-0.581	-0.301	-0.301	-0.233	-0.044	-0.000	-0.000
L6X LEADINg (+)	+1.88	0.147	0.063	-0.475	-0.063	-0.063	-0.000	-0.000	-0.000	-0.000
L6X LEADINg (-)	-2.37	-0.556	0.051	-0.267	-0.051	-0.051	-0.000	-0.000	-0.000	-0.000
POSITIVE $\Delta\dot{m}$	14.34	0.849	0.224	0.626	0.004	0.003	0.181	0.000	0.000	0.000
NEGATIVE $\Delta\dot{m}$	+17.14	-1.578	-0.193	-1.100	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001

TABLE II (cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
 S-IVB STAGE PROPULSION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED VELOCITY AZIMUTH (DEG)	CENTRAL RANGE ANGLE (DEG)
NOMINAL	59.3- 21	28.753	62.287	7367.79	90.007	94.259	14.239
THRUST AND FLOW RATE (+)	*14.24	0.034	0.511	*0.01	*0.001	*0.289	*0.502
THRUST AND FLOW RATE (-)	15.55	*0.040	*0.561	0.01	0.001	0.317	0.551
ISP AND FLOW RATE (+,+)	1.62	*0.006	-0.081	0.00	-0.000	0.045	0.078
ISP AND FLOW RATE (+,-)	-1.66	0.005	0.079	*0.00	0.000	*0.043	*0.075
E.M.R. SHIFT (+)	-6.59	0.022	0.329	*0.01	*0.001	*0.181	*0.314
E.M.R. SHIFT (-)	6.56	*0.020	*0.293	0.00	0.001	*0.162	*0.282
LH2 LOADING (+)	6.57	*0.020	*0.284	0.00	0.001	0.158	0.274
LH2 LOADING (-)	-16.43	0.020	0.303	*0.01	*0.001	*0.167	*0.290
LEX LOADING (+)	-1.88	0.011	0.177	*0.00	*0.000	*0.093	*0.162
LEX LOADING (-)	2.37	*0.012	*0.177	0.00	0.001	0.095	0.164
POSITIVE RSS		18.34	0.047	0.706	0.01	0.403	0.701
NEGATIVE RSS		*17.14	*0.051	*0.720	*0.01	*0.001	*0.393

TABLE 12
AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS		SPACE FIXED FLIGHT PATH ANGLE (DEG)		GROUND RANGE (M)		SPACE FIXED VELOCITY AZIMUTH (DEG)		VEHICLE WEIGHT (LB)	
VARIATIONS	FLIGHT TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)						
NOMINAL	593.21	192487.	7787.09	90.007	1785246.	94.029	70778.		
NUN-PROPELLANT MASS (+)	C.44	-3.	0.00	-0.000	1239.	0.007	9.		
NUN-PROPELLANT MASS (-)	-C.44	3.	-0.00	-0.001	-1237.	-0.007	-9.		
C.G. OFFSET (-Z)	C.05	1.	0.00	-0.001	584.	0.003	-24.		
C.G. OFFSET (+Z)	-C.04	-1.	-0.00	0.000	-597.	-0.003	19.		
C.G. OFFSET (-Y)	-C.C1	0.	-0.00	0.000	6.	-0.001	6.		
C.G. OFFSET (+Y)	C.03	-0.	0.00	0.000	-21.	0.001	-11.		
THRUST MIS. + PITCH	0.15	-1.	0.00	-0.000	1358.	0.007	-65.		
-THRUST MIS. - PITCH	-C.08	1.	-0.00	-0.000	-1439.	-0.007	36.		
THRUST MIS. + YAW	C.C8	-1.	-0.00	-0.001	-72.	-0.001	-34.		
-THRUST MIS. - YAW	-0.C2	0.	-0.00	0.000	-11.	0.000	7.		
POSITIVE RSS	C.47	3.	0.00	0.000	1928.	C.010	43.		
NEGATIVE RSS	-0.45	-3.	-0.00	-0.002	-1991.	-0.010	-79.		

AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
 S-I VB STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** SPACE FIXED POSITION VECTOR **			** SPACE FIXED VELOCITY VECTOR **		
		X (M)	Y (M)	Z (M)	XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
NOMINAL	593.21	6236428.	70133.	2052058.	-2435.83	148.99	7394.82
NON-PROPELLANT MASS (+)	C.44	-459.	28.	1385.	-1.61	-0.01	-0.53
NON-PROPELLANT MASS (-)	-C.44	458.	-28.	-1384.	1.72	0.02	0.57
C.G. OFFSET (-Z)	C.05	-195.	12.	593.	-0.55	-0.01	-0.18
C.G. OFFSET (+Z)	-C.04	197.	-12.	-601.	0.66	0.02	0.22
C.G. OFFSET (-Y)	-C.01	C.	-1.	1.	-0.C0	-0.08	0.00
C.G. OFFSET (+Y)	C.03	3.	1.	-11.	0.01	0.10	0.00
THRUST MISS. + PITCH	C.15	-458.	28.	1387.	-1.60	-0.02	-0.53
THRUST MISS. - PITCH	-C.08	475.	-29.	-1441.	1.75	0.03	0.58
THRUST MISS. + YAW	C.08	12.	-1.	-39.	0.13	-0.05	0.04
THRUST MISS. - YAW	-C.02	6.	-0.	-17.	0.02	0.05	0.01
POSITIVE RSS	C.47	689.	41.	2048.	2.54	C.11	0.84
NEGATIVE RSS	-0.45	-677.	-42.	-2087.	-2.34	-0.09	-0.77

TABLE 12 (Cont'd)

AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
 TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
 S-IVB STAGE NON-PROPELLION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** EARTH FIXED POSITION VECTOR **			XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)	** EARTH FIXED VELOCITY VECTOR ZDCT (M/S)
		X (M)	Y (M)	Z (M)				
NOMINAL	593.21	-63028.	62540.	1814136.	-2036.08	327.45	7073.30	
NON-PROPELLANT MASS (+)	C.44	-355.	65.	1224.	-1.34	0.15	-0.39	
NON-PROPELLANT MASS (-)	-C.44	354.	-64.	-1223.	1.45	-0.14	0.42	
C.G. OFFSET (- Z)	C.05	-165.	26.	578.	-C.49	0.03	-0.14	
C.G. OFFSET (+ Z)	-C.04	169.	-26.	-590.	C.61	-0.C1	0.18	
C.G. OFFSET (- Y)	-C.01	-2.	-1.	6.	-C.01	-0.C8	0.00	
C.G. OFFSET (+ Y)	C.03	6.	1.	-21.	C.02	0.10	0.00	
THRUST MIS. + PITCH	0.15	-388.	61.	1343.	-1.47	0.C7	-0.42	
THRUST MIS. - PITCH	-C.08	410.	-62.	-1423.	1.64	-0.C4	0.47	
THRUST MIS. + YAW	C.08	20.	-1.	-72.	0.16	-0.C3	0.05	
THRUST MIS. - YAW	-C.02	3.	-1.	-11.	0.01	0.C4	0.00	
POSITIVE RSS	C.47	566.	92.	1906.	2.28	0.20	0.66	
NEGATIVE RSS	-0.45	-551.	-93.	-1968.	-2.05	-0.17	-0.60	

TABLE 12 (Cont'd)

AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL
S-IVB STAGE NON-PROPELLANT THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	** VEHICLE ATTITUDE **			** VEHICLE ATTITUDE RATE (DEG/S)		
		PITCH (DEG)	ROLL (DEG)	YAW (DEG)	PITCH (DEG/S)	ROLL (DEG/S)	YAW (DEG/S)
NOMINAL	593.21	-104.480	0.612	-0.105	-0.003	-0.001	-0.060
NON-PROPELLANT MASS (+)	C.44	0.033	-0.001	-0.744	0.000	-0.001	0.056
NON-PROPELLANT MASS (-)	-0.44	0.081	-0.004	0.346	0.003	0.000	0.054
C.G. OFFSET (-Z)	C.C5	0.127	-0.001	-0.392	0.005	-0.000	-0.017
C.G. OFFSET (+Z)	-C.C4	-0.025	-0.005	-0.651	-0.002	-0.000	0.016
C.G. OFFSET (-Y)	-C.C1	-0.006	-0.072	-0.838	0.000	-0.002	0.063
C.G. OFFSET (+Y)	C.03	-0.010	0.062	-0.659	-0.000	0.002	0.037
THRUST MIS. + PITCH	C.15	-0.318	-0.003	0.843	0.002	0.001	0.110
THRUST MIS. - PITCH	-C.08	0.421	-0.002	-0.769	0.000	-0.001	0.070
THRUST MIS. + YAW	C.C8	0.110	-0.406	0.623	0.003	0.001	0.101
THRUST MIS. - YAW	-0.02	-0.002	0.406	0.105	0.000	-0.000	0.017
POSITIVE RSS	C.47	0.466	0.411	1.104	0.008	0.002	0.172
NEGATIVE RSS	-C.45	-0.319	-0.412	-1.507	-0.002	-0.003	-0.017

TABLE 12 (Cont'd)

AS-2C7 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSIONS AT J-2 ENGINE CUTOFF SIGNAL

S-IVB STAGE NCN-PROPULSION THREE-SIGMA DEVIATIONS

VARIATIONS	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POSITIVE WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED VELOCITY AZIMUTH (DEG)	CENTRAL RANGE ANGLE (DEG)
NOMINAL	562.21	28.753	62.287	7367.79	90.007	94.259	18.239
NON-PROPELLANT MASS (+)	C.44	-0.001	-0.013	0.00	-0.007	0.013	
NON-PROPELLANT MASS (-)	-C.44	0.001	0.013	-0.00	-0.007	-0.013	
C.G. OFFSET (-Z)	C.05	-0.000C	-0.006	0.00	-0.001	0.003	0.005
C.G. OFFSET (-Z)	-C.C4	0.000C	0.006	-0.00	0.001	-0.003	-0.006
C.G. OFFSET (+Z)	C.G. OFFSET (+Z)	0.000C	-0.006	0.00	-0.001	0.000	0.000
C.G. OFFSET (-Y)	-C.C1	0.000C	-0.000	0.00	0.000	0.000	-0.000
C.G. OFFSET (+Y)	C.03	0.000C	0.000	0.00	0.007	0.013	
THRUST MIS. + PITCH	C.15	-0.001	-0.014	0.00	-0.008	-0.013	
THRUST MIS. - PITCH	-C.C8	0.001	0.015	-0.00	-0.001	-0.001	-0.000
THRUST MIS. + YAW	C.C8	0.000C	0.001	0.00	0.000	0.000	-0.000
THRUST MIS. - YAW	-0.02	0.000C	0.000	0.00	0.000	0.011	0.019
POSITIVE RSS	C.47	0.001	0.020	0.00	0.000	-0.002	-0.011
NEGATIVE RSS	-C.45	-0.001	-0.020	-0.00	-0.002	-0.011	-0.019

TABLE 13

**AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS**

DISPERSION GROUP	FLIGHT TIME (SEC)	ALTITUDE (M)	VELOCITY (M/S)	SPACE FIXED PATH ANGLE (DEG)	GROUND RANGE (M)	SPACE FIXED VELOCITY AZIMUTH (DEG)	VEHICLE WEIGHT (LB)
S-IB Propulsion +RSS	8.40	5.	0.00	0.001	13658.	0.083	521.
S-IB Propulsion -RSS	3.36	9.	0.00	0.002	7741.	0.043	1C70.
S-IB Non Propulsion +RSS	1.33	3.	0.00	0.000	10795.	0.052	593.
S-IB Non Propulsion -RSS	1.35	10.	0.00	0.003	10407.	0.050	585.
S-IVB Propulsion +RSS	18.34	24.	0.00	0.002	70574.	0.381	910.
S-IVB Propulsion -RSS	17.14	15.	0.00	0.001	69149.	0.372	942.
S-IVB Non Propulsion +RSS	0.47	3.	0.00	0.000	1928.	0.010	43.
S-IVB Non Propulsion -RSS	0.45	3.	0.00	0.002	1991.	0.010	79.
DU Dispersions +RSS	0.04	618.	1.60	0.025	320.	0.023	14.
DU Dispersions -RSS	0.04	618.	1.60	0.025	320.	0.023	14.
Combined Positive RSS	20.22	619.	1.60	0.025	72716.	0.394	1206.
Combined Negative RSS	17.52	618.	1.60	0.025	70384.	0.379	1543.

TABLE 13 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS

DISPERSION GROUP	FLIGHT TIME (SEC)	SPACE FIXED POSITION VECTOR			SPACE FIXED VELOCITY VECTOR		
		X (M)	Y (M)	Z (M)	XDOT (M/S)	YDOT (M/S)	ZDOT (M/S)
S-IB Propulsion	+RSS	8.40	2837.	334.	16561.	10.36	0.12
S-IB Propulsion	-RSS	3.36	5474.	173.	8631.	19.70	0.21
S-IB Non Propulsion	+RSS	1.33	3269.	209.	10383.	12.02	0.25
S-IB Non Propulsion	-RSS	1.35	3429.	200.	9953.	12.28	0.25
S-IVB Propulsion	+RSS	18.34	24260.	1533.	76172.	88.43	0.97
S-IVB Propulsion	-RSS	17.14	25435.	1501.	74428.	90.54	0.96
S-IVB Non Propulsion	+RSS	0.47	689.	41.	2048.	2.54	0.11
S-IVB Non Propulsion	-RSS	0.45	677.	42.	2087.	2.34	0.09
IMU Dispersion	+RSS	0.04	670.	761.	210.	4.09	3.16
IMU Dispersion	-RSS	0.04	670.	761.	210.	4.09	3.16
Combined Positive	RSS	20.22	24662.	1757.	78667.	89.97	3.32
Combined Negative	RSS	17.52	26260.	1704.	75614.	93.59	3.32
							29.29
							31.20

TABLE 13 (Cont'd)

**AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS**

DISPERSION GROUP	FLIGHT TIME (SEC)	EARTH FIXED POSITION VECTOR			EARTH FIXED VELOCITY VECTOR	
		X (M)	Y (M)	Z (M)	XDOT (M/S)	YDOT (M/S)
S-IB Propulsion	+RSS	8.40	2199.	811.	13499.	8.72
S-IB Propulsion	-RSS	3.36	3900.	403.	7657.	15.22
S-IB Non Propulsion	+RSS	1.33	2953.	438.	10676.	11.78
S-IB Non Propulsion	-RSS	1.35	3082.	418.	10299.	11.95
S-IVB Propulsion	+RSS	18.34	19503.	3504.	69717.	77.03
S-IVB Propulsion	-RSS	17.14	20352.	3353.	68439.	78.52
S-IVB Non Propulsion	+RSS	0.47	568.	92.	1906.	2.28
S-IVB Non Propulsion	-RSS	0.45	551.	93.	1968.	2.05
IMU Dispersions	+RSS	0.04	224.	692.	734.	0.80
IMU Dispersions	-RSS	0.04	224.	692.	734.	0.80
Combined Positive	RSS	20.22	19857.	3690.	71839.	78.45
Combined Negative	RSS	17.52	20959.	3474.	69664.	80.90
					7.39	24.15
					8.04	22.88

TABLE 13 (Cont'd)

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS

DISPERSION	FLIGHT TIME (SEC)	VEHICLE ATTITUDE			VEHICLE ATTITUDE RATE PITCH (DEG/S)	VEHICLE ATTITUDE RATE ROLL (DEG/S)	VEHICLE ATTITUDE RATE YAW (DEG/S)	*ROLL (DEG/S)
		PITCH (DEG)	YAW (DEG)	*ROLL (DEG)				
S-IB Propulsion	+RSS	8.40	1.700	0.010	—	0.006	0.000	—
S-IB Propulsion	-RSS	3.36	2.600	0.029	—	0.000	0.001	—
S-IB Non Propulsion	+RSS	1.33	1.852	1.942	—	0.008	0.001	—
S-IB Non Propulsion	-RSS	1.35	1.553	2.016	—	0.000	0.002	—
S-IVB Propulsion	+RSS	18.34	0.849	0.224	—	0.004	0.000	—
S-IVB Propulsion	-RSS	17.14	1.578	0.193	—	0.001	0.001	—
S-IVB Non Propulsion	+RSS	0.47	0.466	0.411	—	0.008	0.002	—
S-IVB Non Propulsion	-RSS	0.45	0.319	0.412	—	0.002	0.003	—
IMU Dispersions	+RSS	0.04	0.044	0.055	—	—	—	—
IMU Dispersions	-RSS	0.04	0.044	0.055	—	—	—	—
Combined Positive	RSS	20.22	2.694	1.998	—	0.013	0.002	—
Combined Negative	RSS	17.52	3.430	2.068	—	0.002	0.004	—

* Not Applicable

TABLE 13 (Cont'd)

**AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
TRAJECTORY DISPERSION ENVELOPE AT J-2 ENGINE CUTOFF SIGNAL
COMBINED S-IB AND S-IVB STAGE THREE-SIGMA DEVIATIONS**

DISPERSION GROUP	FLIGHT TIME (SEC)	GEODETIC LATITUDE (DEG)	LONGITUDE POS. WEST (DEG)	EARTH FIXED VELOCITY (M/S)	EARTH FIXED PATH ANGLE (DEG)	EARTH FIXED VEL. AZIMUTH (DEG)	CENTRAL RANGE ANGLE (DEG)
S-IB Propulsion +RSS	8.40	0.006	0.078	0.00	0.001	0.068	0.152
S-IB Propulsion -RSS	3.36	0.011	0.139	0.00	0.002	0.046	0.079
S-IB Non Propulsion +RSS	1.33	0.007	0.107	0.00	0.000	0.055	0.095
S-IB Non Propulsion -RSS	1.35	0.007	0.110	0.00	0.003	0.053	0.091
S-IVB Propulsion +RSS	18.34	0.047	0.706	0.01	0.002	0.403	0.701
S-IVB Propulsion -RSS	17.14	0.051	0.720	0.01	0.001	0.393	0.683
S-IVB Non Propulsion +RSS	0.47	0.001	0.020	0.00	0.000	0.011	0.019
S-IVB Non Propulsion -RSS	0.45	0.001	0.020	0.00	0.002	0.011	0.019
IMU Dispersions +RSS	0.04	0.006	0.003	1.63	0.027	0.024	0.003
IMU Dispersions -RSS	0.04	0.006	0.003	1.63	0.027	0.024	0.003
Combined Positive RSS	20.22	0.048	0.719	1.63	0.027	0.417	0.724
Combined Negative RSS	17.52	0.053	0.742	1.63	0.027	0.400	0.694

TABLE 14.

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
THREE-SIGMA FLIGHT ENVELOPE OF PERTINENT DESIGN PARAMETERS
FIRST STAGE FLIGHT

FLIGHT TIME (SEC)	RSS	LONGITUDINAL ACCELERATION (M/S ²)	AERO. HEATING INDICATOR (KG-M/M ² -RAD) (X10 ⁻⁶)	TOTAL ANGLE OF ATTACK (DEG)	DYNAMIC PRESSURE (KG/M ²)
0	+	0.222	0.000	0.000	0.
5	-	0.377	0.000	0.000	0.
10	-	0.239	0.000	9.651	2.
15	-	0.414	0.000	10.532	3.
20	-	0.253	0.001	19.086	17.
25	-	0.431	0.001	20.538	14.
30	-	0.268	0.005	24.401	28.
35	-	0.453	0.005	15.078	34.
40	-	0.286	0.016	12.338	49.
45	-	0.491	0.019	12.643	63.
50	-	0.311	0.041	10.683	79.
55	-	0.513	0.050	11.360	102.
60	-	0.328	0.086	7.005	109.
65	-	0.540	0.112	10.540	150.
70	-	0.351	0.165	4.452	142.
75	-	0.576	0.223	8.594	202.
80	-	0.376	0.290	2.880	175.
85	-	0.615	0.400	5.101	255.
90	-	0.396	0.474	2.743	203.
95	-	0.649	0.665	3.614	300.
100	-	0.404	0.731	3.181	234.
105	-	0.661	1.035	3.100	337.
110	-	0.281	1.064	2.505	247.
115	-	0.515	1.515	2.570	343.
120	-	0.409	1.466	2.050	249.
125	-	0.695	1.076	1.578	305.
130	-	0.695	1.974	2.699	326.
135	-	1.092	2.662	1.667	301.
140	-	0.756	2.607	1.826	289.
145	-	1.178	3.317	1.179	328.
150	-	0.831	3.261	1.604	160.
155	-	1.287	4.009	1.415	372.

TABLE 14 (Cont'd)

**AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
THREE-SIGMA FLIGHT ENVELOPE OF PERTINENT DESIGN PARAMETERS
FIRST STAGE FLIGHT**

TABLE 15

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
PERFORMANCE TRADE-OFFS AT S-IB/S-IVB SEPARATION

DISPERSION	TIME (SEC)	ALTITUDE (M)	SPACE FIXED VELOCITY (M/S)	PARAMETER TRADE-OFFS		GROUND RANGE (M)	EARTH FIXED CROSS RANGE (M)
				SPACE FIXED PATH ANGLE (DEG)	SPACE FIXED PATH ANGLE (DEG)		
S-IB STAGE:							
LOX Loading Mass (+%)	+1.49	+414.29	+31.31	+0.403	+0.403	+2089.	+6.
LOX Loading Mass (-%)	-1.46	-420.00	-31.40	-0.409	-0.409	-2077.	-6.
Fuel Loading Mass (+%)	0.00	-494.28	-12.34	+0.109	+0.109	-309.	0.
Fuel Loading Mass (-%)	0.00	+494.28	+12.40	-0.109	-0.109	+309.	0.
Thrust and Flowrate (+%)	-1.38	+840.67	+1.35	-0.680	-0.680	-1199.	-5.
Thrust and Flowrate (-%)	+1.65	-679.33	-2.53	+0.702	+0.702	+1607.	+6.
Isp and Flowrate (+sec ISP)	+0.50	+284.44	+10.49	+0.116	+0.116	+742.	+2.
Isp and Flowrate (-sec ISP)	-0.50	-283.33	-10.16	-0.118	-0.118	-737.	-2.
E.M.R., LOX Bias (+1000 lb)	-0.11	-111.30	-4.25	-0.012	-0.012	-201.	0.
E.M.R., Fuel Bias (+1000 lb)	-0.16	-168.99	-6.47	-0.018	-0.018	-305.	-1.
Non-Propellant Mass (+100 lb)	0.00	-17.74	-0.44	+.004	+.004	-11.	0.
Non-Propellant Mass (-100 lb)	0.00	+17.74	+0.44	-.004	-.004	+11.	0.
Pitch Thrust Mis. (+deg)	0.00	-2064.52	+29.15	+2.205	+2.205	+3110.	+24.
Pitch Thrust Mis. (-deg)	0.00	+1983.87	-29.97	-2.203	-2.203	-316.	-26.
Yaw Thrust Mis. (+deg)	0.00	-43.55	-2.21	+0.015	+0.015	+71.	-3968.
Yaw Thrust Mis. (-deg)	0.00	-27.42	+1.85	+0.029	+0.029	+18.	+3969.
Roll Thrust Mis. (+deg)	0.00	-3.23	-0.05	0.000	0.000	+5.	-273.
Roll Thrust Mis. (-deg)	0.00	-9.68	+0.21	+0.010	+0.010	+13.	+274.
Z.C.G. Offset (+.01 m)	0.00	+64.20	-1.11	-.071	-.071	-125.	-4.
Z.C.G. Offset (-.01 m)	0.00	-65.40	+1.09	+.071	+.071	+125.	+4.
Y.C.G. Offset (+.01 m)	0.00	-0.80	-0.05	0.000	0.000	+4.	-153.
Y.C.G. Offset (-.01 m)	0.00	-0.60	+0.05	0.000	0.000	-3.	+153.

TABLE 16

AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
PERFORMANCE TRADE-OFFS AT J-2 CUTOFF SIGNAL

DISPERSION	PARAMETER TRADE-OFFS			
	TIME (SEC)	GROUND RANGE (M)	EARTH FIXED CROSS RANGE (M)	WEIGHT (LB)
<u>S-IB STAGE:</u>				
LOX Mass (+%)	-0.09	+7849.	+ 323.	+686.
LOX Mass (-%)	+0.11	-7597.	- 314.	-691.
Fuel Mass (+%)	+0.83	-1689.	- 46.	-366.
Fuel Mass (-%)	-0.83	+1686.	+ 46.	+366.
Thrust and Flowrate (+%)	-1.94	-3170	- 189.	+245.
Thrust and Flowrate (-%)	+2.41	+3356.	+ 211.	-331.
ISP and Flowrate (+ sec ISP)	-0.06	+2499.	+ 102.	+244.
ISP and Flowrate (-sec ISP)	+0.04	-2466.	- 101.	-236.
E.M.R., LOX Bias (+1000lb)	+0.14	- 824.	- 30.	-109.
E.M.R., Fuel Bias (+1000 lb)	+0.22	-1248.	- 46.	-165.
Non-Propellant Mass (+100 lb)	+0.03	- 60.	- 2.	- 13.
Non-Propellant Mass (-100 lb)	-0.03	+ 60.	+ 2.	+ 13.
Pitch Thrust Mis. (+ deg)	+0.27	+14323.	+ 605.	-119.
Pitch Thrust Mis. (- deg)	+0.21	-14485.	- 598.	- 89.
Yaw Thrust Mis. (+ deg)	+0.65	- 363.	+ 2.	-281.
Yaw Thrust Mis. (-deg)	0.00	+ 184.	+ 10.	- 3.
Roll Thrust Mis. (+ deg)	+0.02	- 8.	0.	- 5.
Roll Thrust Mis. (-deg)	-0.02	+ 74.	+ 3.	+ 6.
Z.C.G. Offset (+.01 m)	+0.01	- 506.	- 21.	- 5.
Z.C.G. Offset (-.01 m)	-0.01	+ 503.	+ 21.	+ 3.
Y.C.G. Offset (+.01 m)	+0.01	- 5.	0.	= 6.
Y.C.G. Offset (-.01 m)	-0.01	+ 3.	0.	+ 3.
<u>S-IVB STAGE:</u>				
Thrust and Flowrate (+%)	-4.75	-16672.	- 826.	+187.
Thrust and Flowrate (-%)	+5.18	+18312.	+ 926.	-208.
ISP and Flowrate (+sec ISP)	+0.52	+2551.	+ 122.	+229.
ISP and Flowrate (-sec ISP)	-0.53	-2469.	- 119.	-221.
LH ₂ Mass (+%)	+6.57	+27832.	+1359.	- 10.
LH ₂ Mass (-%)	-6.43	-29692.	-1420.	- 41.
LOX Mass (+%)	-1.88	-17307.	- 775.	+ 57.
LOX Mass (-%)	+2.37	+17332.	+ 793.	-125.
E.M.R. Shift (+ sec)	-0.22	-1075.	- 51.	-1.. -1.
E.M.R. Shift (- sec)	+0.22	+957.	+47.	-2.. -1.
Non-Propellant Mass (+ 100 lb)	+0.22	+ 620.	+ 33.	+ 5.
Non-Propellant Mass (- 100 lb)	-0.22	- 619.	- 32.	- 5.
Z.C.G. Offset (+.01 m)	-0.01	- 119.	- 5.	+ 4.
Z.C.G. Offset (-.01 m)	+0.01	+ 117.	+ 5.	- 5.
Y.C.G. Offset (+.01 m)	+0.01	- 4.	0.	- 2.
Y.C.G. Offset (-.01 m)	0.00	+ 1.	0.	+ 1.
Pitch Thrust Mis. (+ deg)	+0.12	+1095.	+ 49.	- 52.
Pitch Thrust Mis. (- deg)	-0.06	-1160.	- 50.	+ 29.
Yaw Thrust Mis. (+ deg)	+0.06	- 58.	- 1.	- 27.
Yaw Thrust Mis. (- deg)	-0.02	- 9.	- 1.	+ 6.

TABLE 17
AS-207 LAUNCH VEHICLE TRAJECTORY DISPERSION ANALYSIS
S-IVB STAGE FLIGHT PERFORMANCE RESERVE

ITEM	DEVIATION	Δ PROPELLANT REQUIRED (LBS)	Δ PRPT. REQUIRED TRADE-OFF FACTOR (Δ PRPT. REQUIRED/DEVIATION)
S-IB STAGE			
Non-Propellant Mass	+ 310 lbs	+ 41	+ 0.13 lb/lb
Thrust Misalignment	+ 0.62° Pitch	+ 74	+ 119.35 lb/deg
Thrust Misalignment	- 0.62° Pitch	+ 56	+ 90.32 lb/deg
Thrust Misalignment	+ 0.62° Yaw	+ 174	+ 280.65 lb/deg
Thrust Misalignment	- 0.62° Yaw	+ 2	+ 3.23 lb/deg
Axial Force Coefficient	Maximum	+ 438	Not Applicable
Axial Force Coefficient	Minimum	- 425	Not Applicable
Headwind	Maximum	+ 273	Not Applicable
Tailwind	Maximum	- 372	Not Applicable
Atmosphere	Minimum	+ 92	Not Applicable
Atmosphere	Maximum	- 171	Not Applicable
Propellant Mass	+ 0.35% LOX	+ 242	+ 691.43 lb/%
Propellant Mass	+ 0.35% Fuel	+ 128	+ 365.71 lb/%
Thrust and Flow Rate	+ 1.5%	- 367	+ 244.67 lb/%
Thrust and Flow Rate	- 1.5%	+ 497	+ 331.33 lb/%
ISP and Flow Rate	+ 0.9 sec	+ 220	+ 244.44 lb/sec
Engine Mixture Ratio	+ 2920 lb. Lox Bias	+ 318	+ 0.11 lb/lb
Engine Mixture Ratio	+ 1290 lb. Fuel Bias	+ 214	+ 0.17 lb/lb
High Surface Temperature	+ 3 σ Fuel Density	- 77	Not Applicable
Low Surface Temperature	- 3 σ Fuel Density	+ 26	Not Applicable
High Surface Winds	+ 3 σ Lox Density	- 82	Not Applicable
Low Surface Winds	- 3 σ Lox Density	+ 823	Not Applicable
S-IVB STAGE:			
Non-Propellant Mass	+ 200 lbs.	+ 192	+ 0.96 lb/lb
Thrust and Flow Rate	+ 3%	- 560	+ 186.67 lb/%
Thrust and Flow Rate	- 3%	+ 625	+ 208.33 lb/%
ISP and Flow Rate	+ 3.12 sec	- 715	+ 229.17 lb/sec
ISP and Flow Rate	- 3.12 sec	+ 691	+ 221.47 lb/sec
BS of other Positive Effects			Not Applicable
REQUIRED FLIGHT PERFORMANCE RESERVE (LESS OF POSITIVE PROPELLENT CONSUMED DEVIATIONS)			1557 lbs

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